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INTERACTIONAL AERODYNAMICS OF THE SINGLE ROTOR HELICOPTER CONFIGURATION

VOLUME VII-G - Frequency Analyses of Wake Split Film Data, Fairings and Surface Devices

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Prepared for
APPLIED TECHNOLOGY LABORATORY
U. S. ARMY RESEARCH AND TECHNOLOGY LABORATORIES (AVRADCOM)
Fort Eustis, Va. 23604

APPLIED TECHNOLOGY LABORATORY POSITION STATEMENT

In 1975 a wind tunnel test program was conducted in the Boeing-Vertol 20-foot V/STOL Wind Tunnel on a 1/5th-scale UTTAS model to investigate and find solutions for several aerodynamic problems encountered during the UTTAS flight-testing. Specifically, these tests focused upon (a) the structure of the hub/rotor wake in the vicinity of the empennage, (b) the formulation of the ground vortex and its relation to hub loads and fuselage loads during transition, and (c) the occurrence of vibratory air pressures from the blade passing over the fuselage. Only portions of the above-mentioned wind tunnel test data were reduced and analyzed in addressing the flight-test problems of the UTTAS aircraft.

Under Contract DAAJ02-77-C-0020, Boeing-Vertol completed analyses on the data to understand more completely the aerodynamic interactions that are involved and to formulate instructions for the guidance of designers in these respects. The results of these studies are applicable to all existing and future single-rotor/tail rotor helicopters. The data have been segregated according to aerodynamic interactions and associated phenomena/problem areas. From this body of knowledge, a generalized set of design guidelines meaningful to the single-rotor helicopter design concept formulation were developed and are included in these reports.

Mr. Robert P. Smith of the Aeronautical Technology Division, Aeromechanics Technical Area, served as project engineer for this effort.

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Frequency	Configuration	Surface Device
Spectrum	Empennage	
Interaction	Flow Modifier	

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This is the seventh of seven sub-volumes of Volume VII containing spectrographs of the model helicopter hub/rotor wake as it was modified by various aerodynamic devices. This sub-volume deals with the effects of various fairings and also of surface devices.

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PREFACE

The entire report describing the investigation of INTERACTIONAL AERODYNAMICS OF THE SINGLE-ROTOR HELICOPTER CONFIGURATION comprises eight numbered volumes bound as 33 separate documents. The complete list of these documents is as follows:

Volume I, Final Report

Volume II, Harmonic Analyses of Airframe Surface Pressure Data
- A – Runs 7-14, Forward Section
- B – Runs 7-14, Mid Section
- C – Runs 7-14, Aft Section
- D – Runs 15-22, Forward Section
- E – Runs 15-22, Mid Section
- F – Runs 15-22, Aft Section
- G – Runs 23-33, Forward Section
- H – Runs 23-33, Mid Section
- I – Runs 23-33, Aft Section

Volume III, Flow Angle and Velocity Wake Profiles in Low-Frequency Band
- A – Basic Investigations and Hubcap Variations
- B – Air Ejector Systems and Other Devices

Volume IV, One-Third Octave Band Spectrograms of Wake Split-Film Data
- A – Buildup to Baseline
- B – Basic Configuration Wake Explorations
- C – Solid Hubcaps
- D – Open Hubcaps
- E – Air Ejectors
- F – Air Ejectors With Hubcaps; Wings
- G – Fairings and Surface Devices

Volume V, Harmonic Analyses of Hub Wake

Volume VI, One-Third Octave Band Spectrograms of Wake Single Film Data
- A – Buildup to Baseline
- B – Basic Configuration Wake Exploration
- C – Hubcaps and Air Ejectors

Volume VII, Frequency Analyses of Wake Split-Film Data
- A – Buildup to Baseline
- B – Basic Configuration Wake Explorations
- C – Solid Hubcaps

D	**–**	**Open Hubcaps**
E	**–**	**Air Ejectors**
F	**–**	**Air Ejectors With Hubcaps; Wings**
G	**–**	**Fairings and Surface Devices**

Volume VIII, Frequency Analyses of Wake Single Film Data

A	**–**	**Buildup to Baseline**
B	**–**	**Basic Configuration Wake Exploration**
C	**–**	**Hubcaps and Air Ejectors**

TABLE OF CONTENTS

INTRODUCTION

Volume VII presents an array of machine plotted graphs of wake angle and velocity versus frequency in the band from 4 to 240 Hz derived from the split film transducers. This encompasses data in the spectrum through 10 times rotor speed which is 1433 RPM or 23.88 Hz.

The graphs showing wake frequency spectra are sequenced in the same order as the Outline of Wake Investigations (Table I). These graphs are distributed among Volumes VII-A through VII-G by the major categories of Table I in the following arrangement:

Volume VII-A	-	Build-up to Baseline
Volume VII-B	-	Basic Configuration
Volume VII-C	-	Effect of Hub Caps Sections 1 & 2
Volume VII-D	-	Effect of Hub Caps Sections 3 & 4
Volume VII-E	-	Effect of Hub Caps Section 5 and Effect of Air Ejectors
Volume VII-F	-	Air Ejectors with Open Hub Caps and Effect of Wings and Misc. Section 1
Volume VII-G	-	Effect of Wings and Misc. Sections 2 & 3

The Table I outline and other material is included for reference and as context to the work of each sub-volume. Table 2, the List of Test Runs, arranges the runs in numerical order and gives pertinent text parameters.

The Index of Rake Positions, Table 3, lists the hot film transducer rake positions in the model coordinate system for each run and its test points. The main feature of Table 3 is the indexing of the test point number to the model water line station and butt line as it varied from run to run. The table groups the runs as they shared the indexing correspondence of point with position. It is emphasized that the runs in a group do not necessarily all share the same number of test points but they do have same correspondence within their respective ranges of test points.

The orientation of the rake is shown pictorially in Figures 1 through 6 for the various test runs. Figure 7 presents a scaled drawing of the model with reference to the three-axis coordinate system.

TABLE 1

OUTLINE OF WAKE INVESTIGATIONS

Description	Configuration Code	Run No.	Base-line
<u>Build-up to Baseline</u>			
1. Nacelles removed	$K_{13}+H_1-N$	149	150
2. Blades off, rotating hub	$K_{13}-M+H_{1.0}$	160	156
3. " " , non-rotating hub	$K_{13}-M+H_{1.0}$	158	156
4. " " , hub off	$K_{13}-M-H_{1.0}$	159	156
<u>Basic Configuration</u>			
1. <u>Wake Explorations near Empennage</u>			
(a) 15" Long. + traverse at T/R C.L.	K_{11}	111	---
(b) 9" Vert. + " above T/R "	"	112	---
(c) 2" " " in vortex	"	113	---
(d) 8" " " (continue 112)	"	114	---
(e) 13" " " behind stab.	"	115	---
(f) Lateral traverse, left stab. (One T.P. only)	"	116	---
(g) Same continued	"	117	---
(h) Same continued (One T.P. only)	"	118	---
(i) Lateral traverse right stab.	"	119	---
(j) T/R effect on wake	$K_{11}+T_2^0$	121	115
2. <u>Climb/Descent Studies</u>			
(a) Climb 900 FPM	K_{11}	135	---
(b) Descent 800 FPM	"	136	---
<u>Effect Of Hub Caps</u>			
1. <u>Solid Caps on Canister</u>			
(a) 7.6" diam. 2.17" ht. soft Pitch Arms	$K_{11}-H_{1.0}+H_{1.2}$	137	136
(b) 7.6" diam. 2.17" ht. stiff Pitch Arms	$K_{13}+H_{1.2}$	153	156
(b) 7.6" diam. 2.45" ht. flt. test config.	$K_{13}+H_{1.2.1}+I_1$ $+E_{1.0}$	207	188

TABLE 1 (CONTINUED)

OUTLINE OF WAKE INVESTIGATIONS

Description	Configuration Code*	Run No.	Base-line
Effect of Hub Caps (Continued)			
2. Solid Caps Raised Above Canister			
(a) 7.6" diam. 2.45" ht. 70" depth, .55 gap	$H_{1.2.2}+I_1+E_{1.0}$	208	188
(b) 10.0" diam. 3.25" ht. 1.55" depth, .50" gap	$H_{1.8.1}+I_1+E_{1.0}$	189	188
(c) 10.0" diam. 4.125" ht. 2.05" depth, .875" gap	$H_{1.8.2}+I_1+E_{1.0}$	190	188
(d) Repeat of 189	" " "	210	188
3. Open Caps Without Underbody			
(a) 10.0" diam. 1.25" gap,blades	$H_{1.0.2}+I_1+E_{1.0}$	193	188/166
(b) " " " gap, no blades	$H_{1.0.1}-M$	166	158
(c) " " 2.05" gap,blades	$H_{1.14.1}+I_1+E_{1.0}$	211	188
(d) " " 1.75" gap, no blades	$H_{1.0.1}-M$	165	158
(e) " " 1.87" gap,blades	$H_{1.0.3}+I_1+E_{1.0}$	191	188
(f) 16" diam. 2.00" gap,blades	$H_{1.7.1}$	168	156/167
(g) " " " gap, no blades	$H_{1.7.1}-M$	167	158
(h) " " 4.00" gap,blades	$H_{1.7.2}$	169	156
4. Open Caps with Underbody			
(a) 7.6" diam. 1.25" gap	$H_{1.11.1}+I_2+E_{1.0}$	194	188
(b) " " " "	$H_{1.11.1}+I_2+E_{4.0}$	198	188
(c) " " " " center post	$H_{1.11.2}+I_2$	202	194
(d) 10.0" diam. .5" gap, no blades	$H_{1.5.1}-M$	164	158
(e) " " 1.25" gap, no blades	$H_{1.5.2}-M$	161	158
(f) " " 2.0" gap, no blades	$H_{1.5.4}-M$	163	158
(g) " " 4.0" gap, no blades	$H_{1.5.3}-M$	162	158
(h) " " 1.25" gap	$H_{1.5.2}$	154	156/161

*Basic Code is K13.

TABLE 1 (CONTINUED)

OUTLINE OF WAKE INVESTIGATIONS

Description	Configuration Code*	Run No.	Base-line
5. <u>Miscellaneous Hub Covers</u>			
(a) Hub fairing 16" diam.	$H_{1.3}$	151	150
(b) Wham-O-Frisbee 10" diam.	$H_{1.9.0}+E_{1.2}$	182	181
(c) Fab. glass Frisbee 16" diam.	$H_{1.9.1}+E_{1.2}$	183	181
<u>Effect of Air Ejectors</u>			
1. Basic system no blowing	$H_{1.0}+E_{1.0}$	172	156
2. " " 40 psi	" "	173	156/172
3. " " 150 psi	" "	174	156/172
4. Wide chord shroud 40 psi	$H_{1.0}+E_{2.5.1}$	175	156/173
5. Wide " " 150 psi	" "	176	156/174
6. W/C shroud w. lip 40 psi	$H_{1.0}+E_{3.5.2}$	184	156/173
7. Same Contoured Parallel 150 psi	$H_{1.0}+E_{3.5.4}$	187	156/174
8. Bifurcated duct 0 psi	$H_{1.0}+E_{5.0}$	203	156
9. " " 40 psi	" "	204	156/203
10. " " 150 psi	" "	205	156/203
<u>Air Ejectors with Open Hub Caps with Underbodies</u>			
1. 7.6" diam. 1.25" gap, 0 psi	$H_{1.11.1}+l_2+E_{1.0}$	194	188/172
2. " " " " 20 psi	" " "	195	188
3. " " " " 40 psi	" " "	196	188/173
4. " " " " 150 psi	" " "	197	188/174
5. " " " " 0 psi	$H_{1.11.1}+I_2+E_{4.0}$	198	188/194
6. " " " " 40 psi	" " "	199	188/196
7. " " " " 150 psi	" " "	200	188/196
8. Same with center post	$H_{1.11.2}+I_2+E_{4.6}$	201	188/200
9. 10.0" diam. 2.0" gap wide ch'd. shroud (150 psi)	$H_{1.5.4}+E_{2.5.1}$	177	156/176
<u>Effect of Wings and Misc.</u>			
1. Wings			
(a) Nacelle-mounted stub wing	$H_{1.0}+W_{1.0}+E_{1.1}$	178	181
(b) Single slotted flapped wing	$H_{1.0}+W_{3.0}+E_{1.0}$	180	181
(c) Dougle slotted flapped wing	$H_{1.0}+W_{2.0}+E_{1.0}$	179	181
(d) Boom-mounted stub wing	$H_{1.0}+W_{4.0}$	186	156

*Basic Code is K13.

TABLE 1 (CONTINUED)

OUTLINE OF WAKE INVESTIGATIONS

Description	Configuration Code*	Run No.	Base-line
2. Crown Fairings			
(a) Flat top behind shaft	$K_{11}+D_1$	140	138
(b) Round top behind shaft	$K_{11}+D_2$	141	138
(c) Extended flat top fairing	H_1+D_4	170	156
(d) Flat top + 16" cap, 4" gap	$H_{1\cdot7\cdot2}+D_4$	171	170
(e) Forward fairing/nacelle fairing	$P_{1\cdot0}$	152	156
3. Surface Devices			
(a) Vortex generators	$K_{11}+VG_{2,1}$	139	138
(b) Guidevane between nacelles	$K_{11}+FV_1$	142	138
(c) Longitudinal strakes	$H_{1\cdot5,3}+S_4$	155	156
(d) 14% porosity spoiler	$K_{11}+X_1$	143	138

*Basic Code is K13 unless noted otherwise.

TABLE 2

LIST OF TEST RUNS

BASIC INVESTIGATIONS OF THE HUB WAKE

RUN NO.	CONFIGURATION/CONDITION	V_{TUN} KNOTS	RPM MR/TR	DISK LDG. psf	MODEL ANGLES $\alpha°$	MODEL ANGLES $\psi°$	MR HT. h/d	TAIL ROTOR
111	K_{11}/15" Long. wake traverse at TR center line	80	1433/0	8	6.0	-2.0	∞	Off
112	" /9" Vert. wake traverse above TR center line	"	"	"	"	"	"	"
113	" /2" Vert traverse through MR vortex	"	"	"	"	"	"	"
114	" /8" Vert. traverse below TR center line	"	"	"	"	"	"	"
115	" /13" Vert. traverse behind stabilizer	"	"	"	"	"	"	"
116	" /Lateral traverse - left stabilizer	"	"	"	"	"	"	"
117	" /116 continued	"	"	"	"	"	"	"
118	" /116 continued	"	"	"	"	"	"	"
119	" /Lateral traverse - right stabilizer	"	"	"	"	"	"	"
121	$K_{11}+T_2$/Effect of tail rotor flow on wake	"	1433/ 4500	"	"	"	"	On
135	K_{11}/Wake in 900 fpm climb	"	"	"	-6.0	-4.5	"	Off
136	" /Wake in 800 fpm descent	"	"	"	6.0	-2.0	"	"

TABLE 2 (CONTINUED)

LIST OF TEST RUNS

EVALUATION OF WAKE-ALTERING DEVICES

RUN NO.	CONFIGURATION/CONDITION	V_{TUN} KNOTS	RPM MR/TR	DISK LDG. psf	MODEL ANGLES α°	ψ°	MR HT. h/d	TAIL ROTOR
137	$K_{11}-H_{1.0}+H_{1.2}$/Effect of 7.6 inch diam. solid hub cap	80	1433/0	8	6	-3.8	∞	Off
138	K_{11}/Repeat of base run	"	"	"	"	"	"	"
139	$K_{11}+VG_{2.1}$/Effect of vortex generators on aft crown	"	"	"	"	"	"	"
140	$K_{11}+D_1$/Flat-topped "doghouse" fairing on aft crown	"	"	"	"	"	"	"
141	$K_{11}+D_2$/Rounded-top fairing	"	"	"	"	"	"	"
142	$K_{11}+FV_1$/Deflection vane on crown between nacelles	"	"	"	"	"	"	"
143	$K_{11}+X_1$/Variable porosity spoiler	"	"	"	"	"	"	"
149	$K_{13}+H_1-N_1$/Effect of nacelles off also add stiff pitch arms (K_{13})	60	1075/0	4.5	"	"	"	"
150	$K_{13}+H_1$/60 knot baseline	"	"	"	"	"	"	"
151	$K_{13}+H_{1.3}$/16 inch diam. helmet fairing	"	"	"	"	"	"	"
152	$K_{13}+P_{1.0}$/Pylon and intake fairings	80	1433/0	8	"	"	"	"
153	$K_{13}+H_{1.2}$/Repeat 137 with K_{13} pitch arms	"	"	"	"	"	"	"

TABLE 2 (CONTINUED)

LIST OF TEST RUNS

EVALUATION OF WAKE-ALTERING DEVICES

RUN NO.	CONFIGURATION/CONDITION	V_{TUN} KNOTS	RPM MR/TR	DISK LDG. psf	MODEL ANGLES		MR HT.	TAIL ROTOR
					α°	ψ°	h/d	
154	$K_{13}+H_{1.5.2}$/10" open hub cap, 7" underbody, 1.25"gap	80	1433/0	8	6	-3.8	∞	Off
155	$K_{13}+H_{1.5.2}+S_4$/Same as 154 except strakes on aft crown	"	"	"	"	"	"	"
156	$K_{13}+H_{1.0}$/Baseline with K_{13},i.e., stiff pitch arms	"	"	"	"	"	"	"
158	$K_{13}-M+H_{1.0}$/Wake studies with blades off, hub not rotating	"	0/0	"	"	"	"	"
159	$K_{13}-M-H_{1.0}$/Wake studies with hub off	"	"	"	"	"	"	"
160	$K_{13}-M+H_{1.0}$/Same as 158 except hub is rotating	"	1433/0	"	"	"	"	"
161	$K_{13}-M+H_{1.5.2}$/Repeat of 154 without blades	"	0/0	"	"	"	"	"
162	$K_{13}-M+H_{1.5.3}$/Same as 161 except 4" gap	"	"	"	"	"	"	"
163	$K_{13}-M+H_{1.5.4}$/Same as 161 except 2" gap	"	"	"	"	"	"	"
164	$K_{13}-M+H_{1.5.1}$/Same as 161 except 0.5" gap	"	"	"	"	"	"	"
165	$K_{13}-M+H_{1.0.1}$/ 10" open hub cap,no underbody,same cap vert.position as Run 154	"	"	"	"	"	"	"
166	$K_{13}-M+H_{1.0.2}$/Same as 165 with cap lowered by 0.5"	"	"	"	"	"	"	"

TABLE 2 (CONTINUED)

LIST OF TEST RUNS

EVALUATION OF WAKE-ALTERING DEVICES

RUN NO.	CONFIGURATION/CONDITION	V_{TUN} KNOTS	RPM MR/TR	DISK LDG, psf	MODEL ANGLES		MR HT.	TAIL ROTOR
					α°	ψ°	h/d	
167	$K_{13}-M+H_{1.7.1}$/16" open cap, no underbody, 2" gap	80	0/0	8	6	-3.8	∞	Off
168	$K_{13}+H_{1.7.1}$/Blades on, same cap config. as 167	"	1433/0	"	"	"	"	"
169	$K_{13}+H_{1.7.2}$/16" open cap, no underbody, 4" gap	"	"	"	"	"	"	"
170	$K_{13}+H_{1.0}+D_{4.0}$/Extended flat top fairing on aft crown	"	"	"	"	"	"	"
171	$K_{13}+H_{1.7.2}+D_{4.0}$/Same fairing as 170, same cap as 169	"	"	"	"	"	"	"
172	$K_{13}+H_{1.0}+E_{1.0}$(0psi)/Basic air ejector zero blowing baseline	"	"	"	"	"	"	"
173	$K_{13}+H_{1.0}+E_{1.0}$(40 psi)/Same as 172 with 40 psi supply	"	"	"	"	"	"	"
174	$K_{13}+H_{1.0}+E_{1.0}$(150 psi)/Same as 172 with 150 psi supply	"	"	"	"	"	"	"
175	$K_{13}+H_{1.0}+E_{2.5.1}$(40 psi)/Ejector with wide chord shroud at 40 psi	"	"	"	"	"	"	"
176	$K_{13}+H_{1.0}+E_{2.5.1}$(150 psi)/Same as 174 with 150 psi supply	"	"	"	"	"	"	"
177	$K_{13}+H_{1.5.4}+E_{2.5.1}$(150 psi)/Same as 176 with 10" cap like 163	"	"	"	"	"	"	"
178	$K_{13}+H_{1.0}+W_{1.0}+E_{1.1}$(0 psi)/Nacelle mounted wing	"	"	"	"	"	"	"

TABLE 2 (CONTINUED)

LIST OF TEST RUNS

EVALUATION OF WAKE-ALTERING DEVICES

RUN NO.	CONFIGURATION/CONDITION	V_{TUN} KNOTS	RPM MR/TR	DISK LDG. psf	MODEL ANGLES α°	MODEL ANGLES ψ°	MR HT. h/d	TAIL ROTOR
179	$K_{13}+H_{1.0}+W_{2.0}+E_{1.0}$ (0 psi)/Double slotted flapped wing	80	1433/0	8	6	-3.8	∞	Off
180	$K_{13}+H_{1.0}+W_{3.0}+E_{1.0}$ (0 psi)/Single slotted flapped wing	"	"	"	"	"	"	"
181	$K_{13}+H_{1.0}+E_{1.2}$ (0 psi)/Baseline with ejector tube moved aft	"	"	"	"	"	"	"
182	$K_{13}+H_{1.9.0}+E_{1.2}$ (0 psi)/Standard 10" frisbee	"	"	"	"	"	"	"
183	$K_{13}+H_{1.9.1}+E_{1.2}$ (0 psi)/16" fabricated frisbee	"	"	"	"	"	"	"
184	$K_{13}+H_{1.0}+E_{3.5.2}$ (40 psi)/Wide chord with lip at 40 psi	"	"	"	"	"	"	"
185	$K_{13}+H_{1.0}+E_{3.5.2}$ (150 psi)/Same as 184 with 150 psi air	"	"	"	"	"	"	"
186	$K_{13}+H_{1.0}+W_{4.0}$/Boom mounted stub wing	"	"	"	"	"	"	"
187	$K_{13}+H_{1.0}+E_{3.5.4}$ (150 psi)/Like 185 with modified shroud	"	"	"	"	"	"	"
188	$K_{13}+H_{1.0}+I_1+E_{1.0}$ (0 psi)/Baseline with I_1 instr. ring	"	"	"	"	"	"	"
189	$K_{13}+H_{1.8.1}+I_1+E_{1.0}$ (0 psi)/Solid cap, 10" diam. 3.25" height	"	"	"	"	"	"	"
190	$K_{13}+H_{1.8.2}+I_1+E_{1.0}$ (0 psi)/Same as 190 except + 4.12" height	"	"	"	"	"	"	"

TABLE 2 (CONTINUED)

LIST OF TEST RUNS

EVALUATION OF WAKE-ALTERING DEVICES

RUN NO.	CONFIGURATION/CONDITION	V_{TUN} KNOTS	RPM MR/TR	DISK LDG. psf	MODEL ANGLES $\alpha°$	MODEL ANGLES $\psi°$	MR HT. h/d	TAIL ROTOR
191	$K_{13}+H_{1.0.2}+I_1+E_{1.0}$ (0 psi)/10" cap, no underbody, 1.87" gap	80	1433/0	8	6	-3.8	∞	Off
193	$K_{13}+H_{1.0.2}+I_1+E_{1.0}$ (0 psi)/10" cap, no underbody, 1.25" gap	"	"	"	"	"	"	"
194	$K_{13}+H_{1.11.1}+I_2+E_{1.0}$(0 psi)/7.6" cap, underbody, 1.25" gap	"	"	"	"	"	"	"
195	$K_{13}+H_{1.11.1}+I_2+E_{1.0}$(20 psi)/Same as 194 with 20 psi air	"	"	"	"	"	"	"
196	$K_{13}+H_{1.11.1}+I_2+E_{1.0}$(40 psi)/Same as 194 with 40 psi air	"	"	"	"	"	"	"
197	$K_{13}+H_{1.11.1}+I_2+E_{1.0}$(150 psi)/Same as 194 with 150 psi air	"	"	"	"	"	"	"
198	$K_{13}+H_{1.11.1}+I_2+E_{4.0}$ (0 psi)/Same as 194 except blowing tube 2" aft	"	"	"	"	"	"	"
199	$K_{13}+H_{1.11.1}+I_2+E_{4.0}$ (40 psi)/Same as 198 with 40 psi air	"	"	"	"	"	"	"
200	$K_{13}+H_{1.11.1}+I_2+E_{4.0}$ (150 psi)/Same as 198 with 150 psi air	"	"	"	"	"	"	"
201	$K_{13}+H_{1.11.2}+I_2+E_{4.0}$ (150 psi)/Same as 200 except center support cap	"	"	"	"	"	"	"
202	$K_{13}+H_{1.11.2}+I_2$/Baseline with I_2 and no blowing tube	"	"	"	"	"	"	"
203	$K_{13}+H_{1.0}+E_{5.0}$(0 psi)/Bifurcated air duct baseline	"	"	"	"	"	"	"

TABLE 2 (CONTINUED)

LIST OF TEST RUNS

EVALUATION OF WAKE-ALTERING DEVICES

RUN NO.	CONFIGURATION/CONDITION	V_{TUN} KNOTS	RPM MR/TR	DISK LDG. psf	MODEL ANGLES $\alpha°$	MODEL ANGLES $\psi°$	MR HT. h/d	TAIL ROTOR
204	$K_{13}+H_{1.0}+E_{5.0}$ (150 psi)/Bifurcated duct with 150 psi air	80	1433/0	8	6	-3.8	∞	Off
205	$K_{13}+H_{1.0}+E_{5.0}$ (40 psi)/Same as 204 with 40 psi air	"	"	"	"	"	"	"
207	$K_{13}+H_{1.2.1}+I_1+E_{1.0}$ (0 psi)/7.6" solid cap, no gap	"	"	"	"	"	"	"
208	$K_{13}+H_{1.2.2}+I_1+E_{1.0}$ (0 psi)/Same as 207 except 0.55" gap	"	"	"	"	"	"	"
210	$K_{13}+H_{1.15.1}+I_1+E_{1.0}$ (0 psi)/Repeat of 189	"	"	"	"	"	"	"
211	$K_{13}+H_{1.14.1}+I_1+E_{1.0}$ (0 psi)/Like 189 and 210 except cap is open	"	"	"	"	"	"	"

TABLE 3

INDEX TO RAKE POSITIONS

RUN NUMBER	TEST POINT	WATER LINE	MODEL STATION	BUTT LINE	LOCATION FIGURE
111	20	53.5	103.1	-7.25	1
	21	"	"	"	
	22	"	105.0	"	
	24	"	107.0	"	
	26	"	109.0	"	
	28	"	111.0	"	
	30	"	112.9	"	
	32	"	114.9	"	
	34	"	116.9	"	
	36	"	118.9	"	
112	2	48.9	107.3	-7.25	1
	4	50.8	"	"	
	6	52.7	103.3	"	
	8	54.5	"	"	
	10	56.2	"	"	
	12	57.2	"	"	
113	2	51.7	103.3	-3.25	1
	4	52.3	"	"	
	6	52.8	"	"	
	8	53.3	"	"	
	10	53.9	"	"	
	11	53.3	"	"	
114	2	44.5	103.0	-3.25	1
	4	46.4	"	"	
	6	48.2	"	"	
	8	50.0	"	"	
	10	51.9	"	"	
115	3	52.9	124.7	-3.25	1
	4	52.0	"	"	
	6	50.0	"	"	
	9	48.0	"	"	
	10	46.0	"	"	
	12	44.1	"	"	
	14	42.1	"	"	
	16	53.0	"	"	
	18	54.0	"	"	
	20	55.0	"	"	

TABLE 3 (CONTINUED)

INDEX TO RAKE POSITIONS

RUN NUMBER	TEST POINT	WATER LINE	MODEL STATION	BUTT LINE	LOCATION FIGURE
116	7	36.9	100.5	-17.5	1
117	2	37.6	100.5	-16.0	1
	4	"	"	-14.0	
	6	37.3	99.6	-12.0	
	8	"	"	-10.0	
	10	"	"	- 8.0	
118	2	37.6	100.5	- 6.0	1
119	2	37.3	99.6	+ 6.0	1
	5	"	"	8	
	8	"	"	10	
	9	"	"	"	
	14	"	"	14	
	16	"	"	16	
	20	51.5	102.5	17.5	
	25	52.3	101.7	-17.5	
121	3	62.9	129.0	+ 5.7	2
	4	53.5	"	"	
	6	50.1	"	"	
	8	46.0	"	"	
	10	42.1	"	"	
135	2	56.9	106.3	- 5.7	3
	4	54.5	"	"	
	6	52.5	"	"	
	8	50.5	"	"	
	10	48.5	"	"	
	12	46.5	"	"	
	14	44.5	"	"	
136	2	56.5	104.0	- 8.0	4
	4	54.5	"	"	
	6	52.5	"	"	
	8	50.6	"	"	
	10	48.5	"	"	
	12	46.5	"	"	
	14	44.5	"	"	
	17	37.1	"	"	
	18	39.0	"	"	
	19	41.0	"	"	

TABLE 3 (CONTINUED)

INDEX TO RAKE POSITIONS

RUN NUMBER	TEST POINT	WATER LINE	MODEL STATION	BUTT LINE	LOCATION FIGURE
137	3	38.7	98.4	- 8.0	5
	5	39.9	"	"	
	7	42.0	100.5	"	
	9	44.0	"	"	
	11	46.0	103.6	"	
	13	48.0	"	"	
	15	50.0	"	"	
	17	52.0	"	"	
	19	54.0	"	"	
138-41, 143	2	38.8	98.4	- 8.0	5
	3	40.0	"	"	
	4	42.0	100.5	"	
	5	44.0	"	"	
	6	46.0	103.6	"	
	7	48.0	"	"	
	8	50.0	"	"	
	9	52.0	"	"	
	10	54.0	"	"	
142	7	37.8	98.4	- 8.0	5
	8	"	"	"	
	9	40.2	"	"	
	10	42.0	100.5	"	
	11	44.0	"	"	
	12	46.0	103.6	"	
	13	48.0	"	"	
	14	50.0	"	"	
	15	52.0	"	"	
	16	54.0	"	"	
	17	56.8	"	"	

TABLE 3 (CONTINUED) INDEX TO RAKE POSITIONS					
RUN NUMBER	TEST POINT	WATER LINE	MODEL STATION	BUTT LINE	LOCATION FIGURE
149-151	2	38.8	98.5	- 8.0	5
	3	40.0	"	"	
	4	42.0	100.6	"	
	5	44.0	"	"	
	6	46.0	103.5	"	
	7	48.0	"	"	
	8	50.0	"	"	
	9	52.0	"	"	
	10	54.0	"	"	
152-6, 158	2	42.9	97.9	0.0	6
161-4, 166	3	44.9	"	"	
167, 169-71	4	46.9	100.6	"	
175, 177-9	5	48.9	"	"	
180,182,184	6	50.9	104.6	"	
186-8, 190	7	52.9	"	"	
191,193,194	8	54.9	"	"	
196,198,201	9	56.9	"	"	
204,207,208					
211					
159	1	54.9	104.6	0.0	6
	2	52.9	"	"	
	3	50.7	"	"	
	4	48.6	100.6	"	
	5	46.7	"	"	
160,203	5	42.9	97.9	0.0	6
	6	44.9	"	"	
	7	46.9	100.6	"	
	8	48.9	"	"	
	9	50.9	104.6	"	
	10	52.9	"	"	
	11	54.9	"	"	
165	3	44.9	97.9	0.0	6
	4	42.9	"	"	
	5	46.9	100.6	"	
	6	48.9	"	"	
	7	50.9	104.6	"	
	8	52.9	"	"	

TABLE 3 (CONTINUED)

INDEX TO RAKE POSITIONS

RUN NUMBER	TEST POINT	WATER LINE	MODEL STATION	BUTT LINE	LOCATION FIGURE
168, 183	4	42.9	97.9	0.0	6
	5	44.9	"	"	
	6	46.9	100.6	"	
	7	48.9	"	"	
	8	50.9	104.6	"	
	9	52.9	"	"	
	10	54.9	"	"	
172	3	42.9	97.9	0.0	6
	4	44.9	"	"	
	6	44.9	"	"	
	7	46.9	100.6	"	
	8	48.9	"	"	
	9	50.9	104.6	"	
	10	52.9	"	"	
	11	54.9	"	"	
173,174,176 185,195,197 199,200,205 210	1	42.9	97.9	0.0	6
	2	44.9	"	"	
	3	46.9	100.6	"	
	4	48.9	"	"	
	5	50.9	104.6	"	
	6	52.9	"	"	
	7	54.9	"	"	
181	2	42.9	97.9	0.0	6
	3	44.9	"	"	
	4	46.9	100.6	"	
	5	48.9	"	"	
	6	50.9	104.6	"	
	7	52.9	"	"	
	9	54.9	"	"	
	10	"	"	"	
	11	"	"	"	
	12	"	"	"	
	13	42.9	97.9	"	

TABLE 3 (CONTINUED)

INDEX TO RAKE POSITIONS

RUN NUMBER	TEST POINT	WATER LINE	MODEL STATION	BUTT LINE	LOCATION FIGURE
189	29	42.9	97.9	0.0	6
	30	44.9	"	"	
	31	46.9	100.6	"	
	32	48.9	"	"	
	33	"	"	"	
	34	50.9	104.6	"	
	35	"	"	"	
	36	48.9	100.6	"	
	37	50.9	104.6	"	
	38	52.9	"	"	
	39	54.9	"	"	
202	3	43.4	97.9	0.0	6
	4	44.9	"	"	
	5	46.9	100.6	"	
	6	48.9	"	"	
	7	50.9	104.6	"	

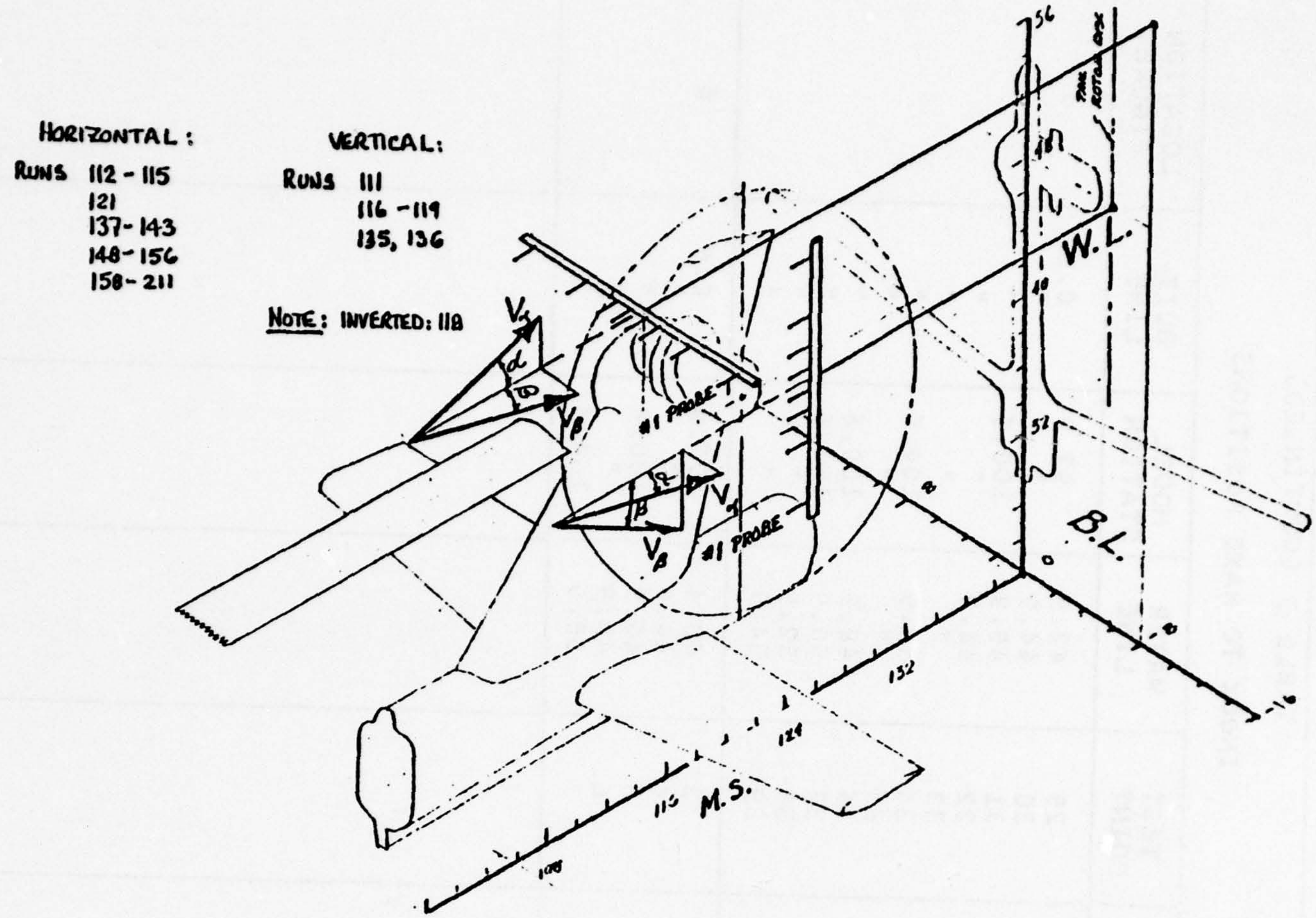


FIGURE 1 - RAKE ORIENTATION DIAGRAM

RUN 121

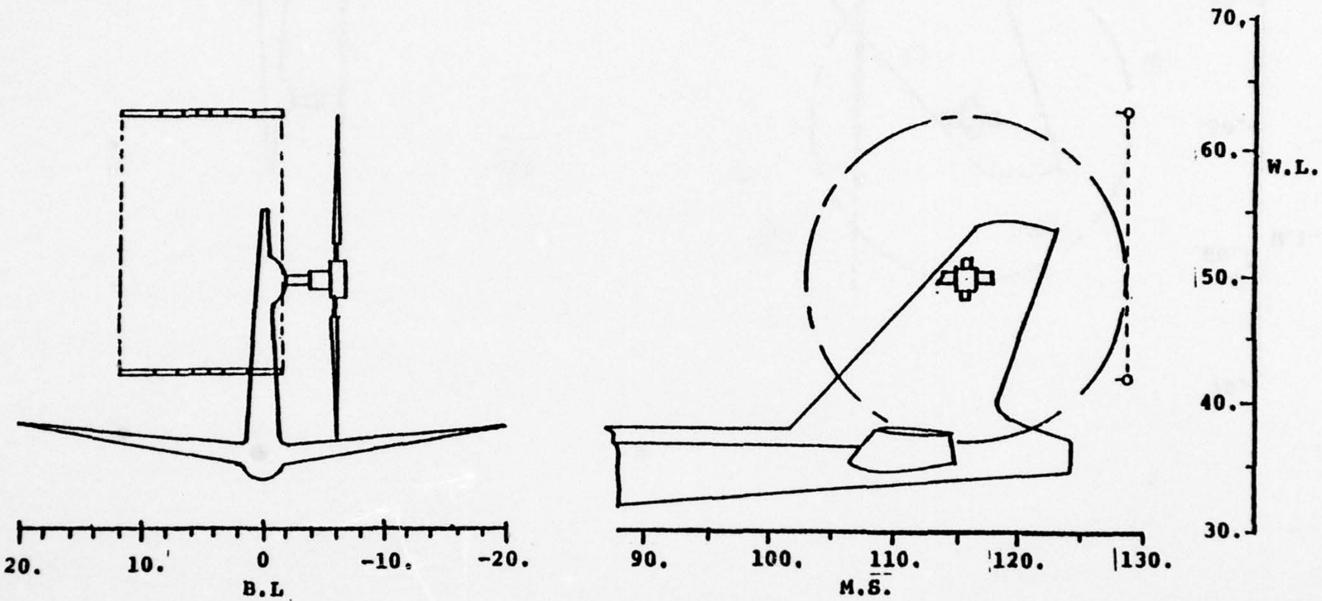


FIGURE 2 -HOT FILM RAKE LOCATIONS

RUN 135

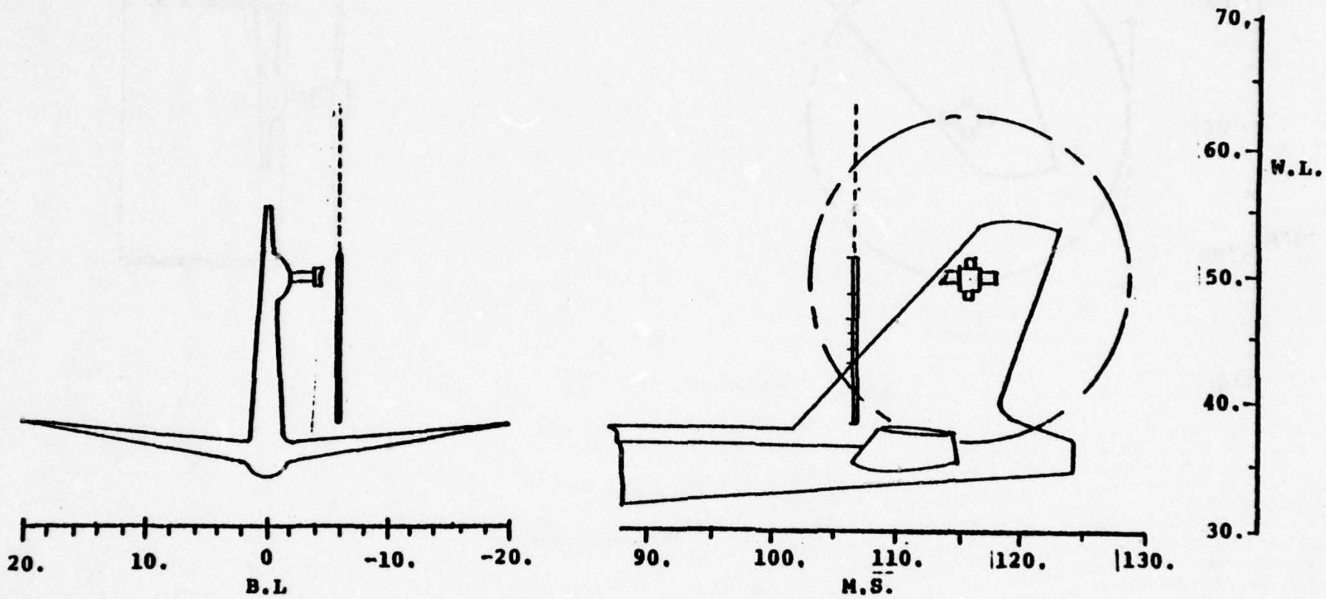


FIGURE 3 -HOT FILM RAKE LOCATIONS

RUN 136

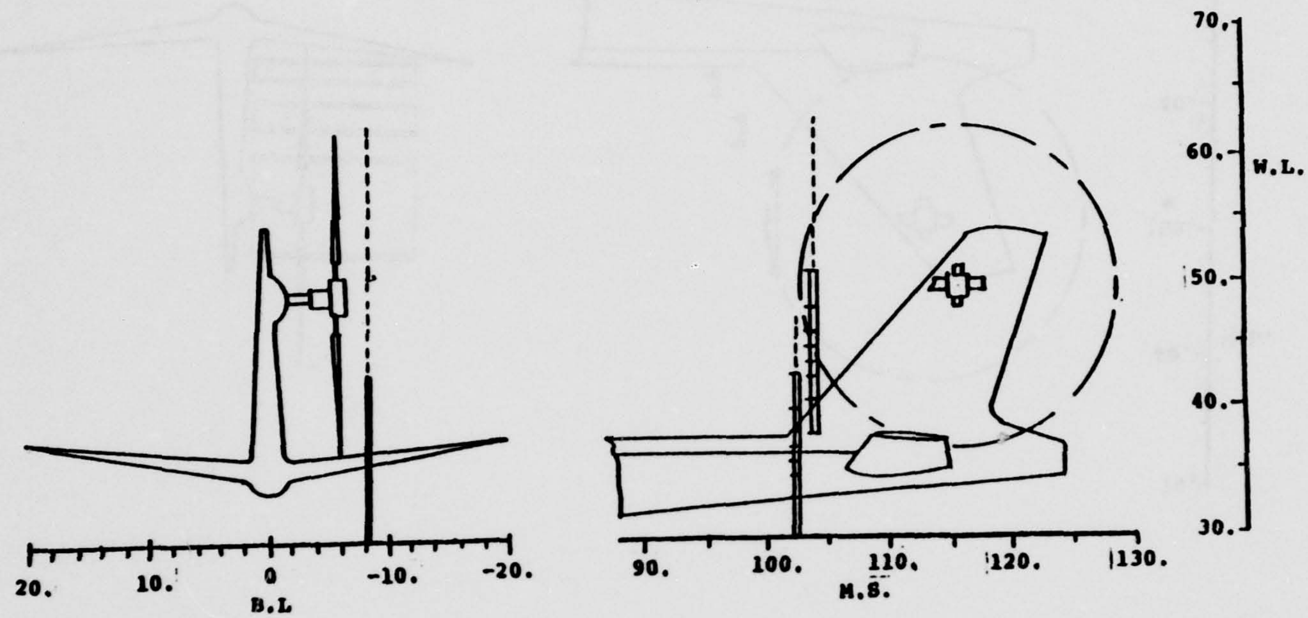


FIGURE 4 -HOT FILM RAKE LOCATIONS

RUN 137, 138, 139, 140, 141, 142,
143, 148, 149, 150, 151

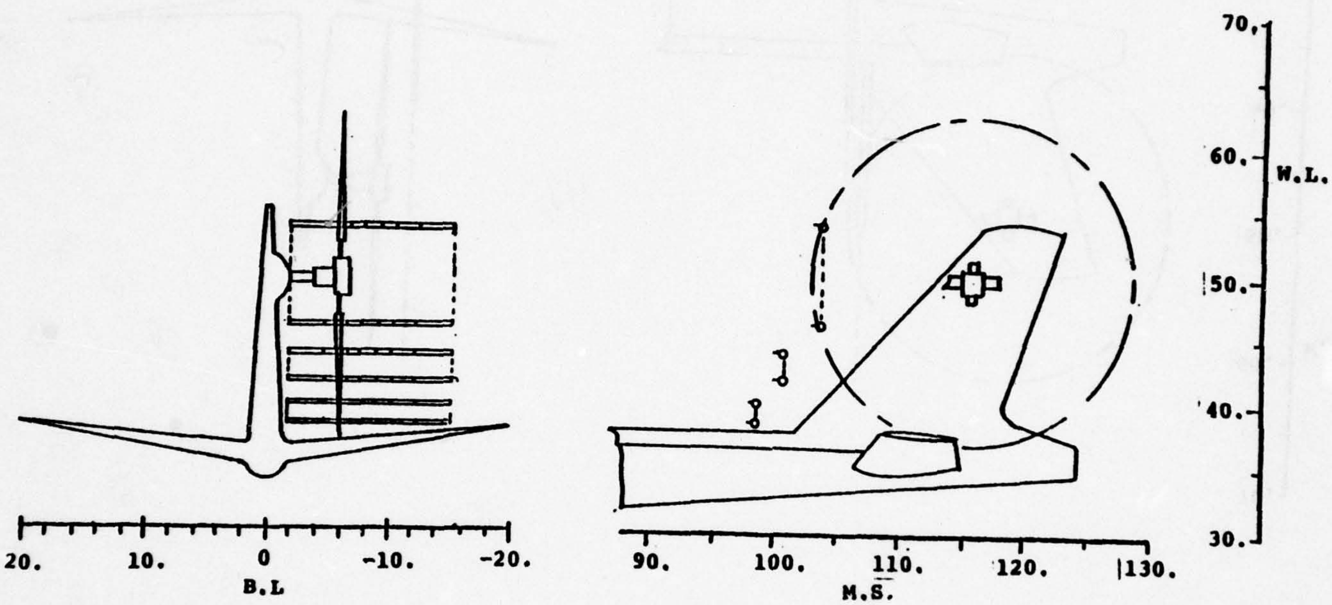


FIGURE 5 -HOT FILM RAKE LOCATIONS

RUN 152-156, 158-211

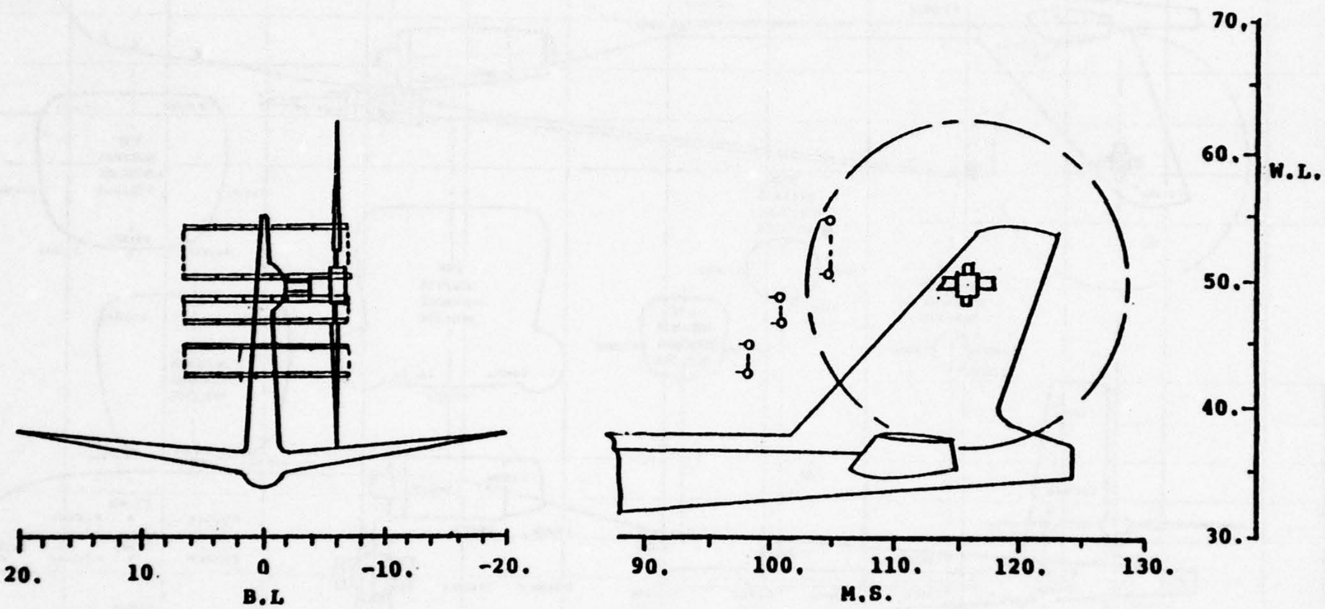


FIGURE 6 -HOT FILM RAKE LOCATIONS

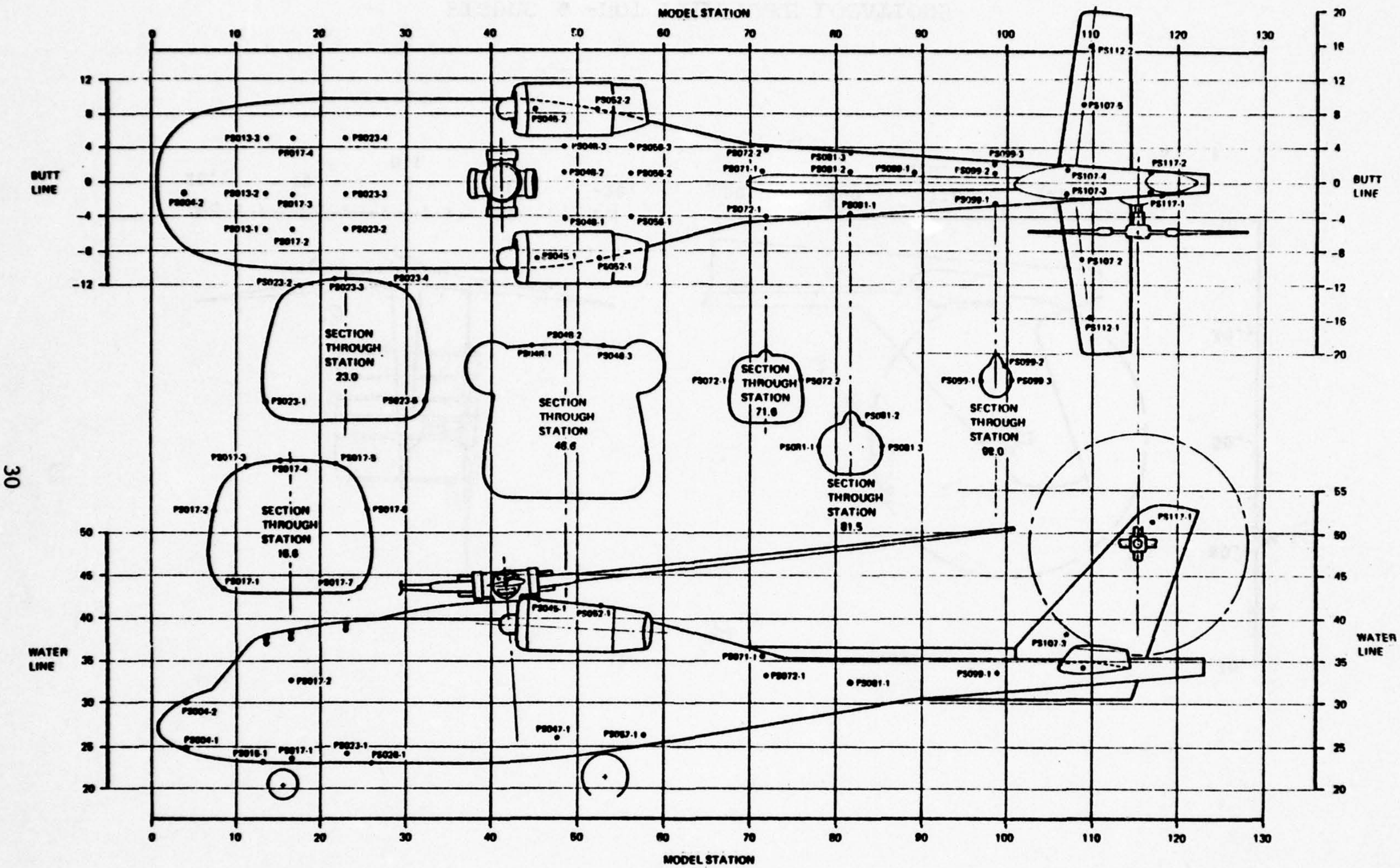
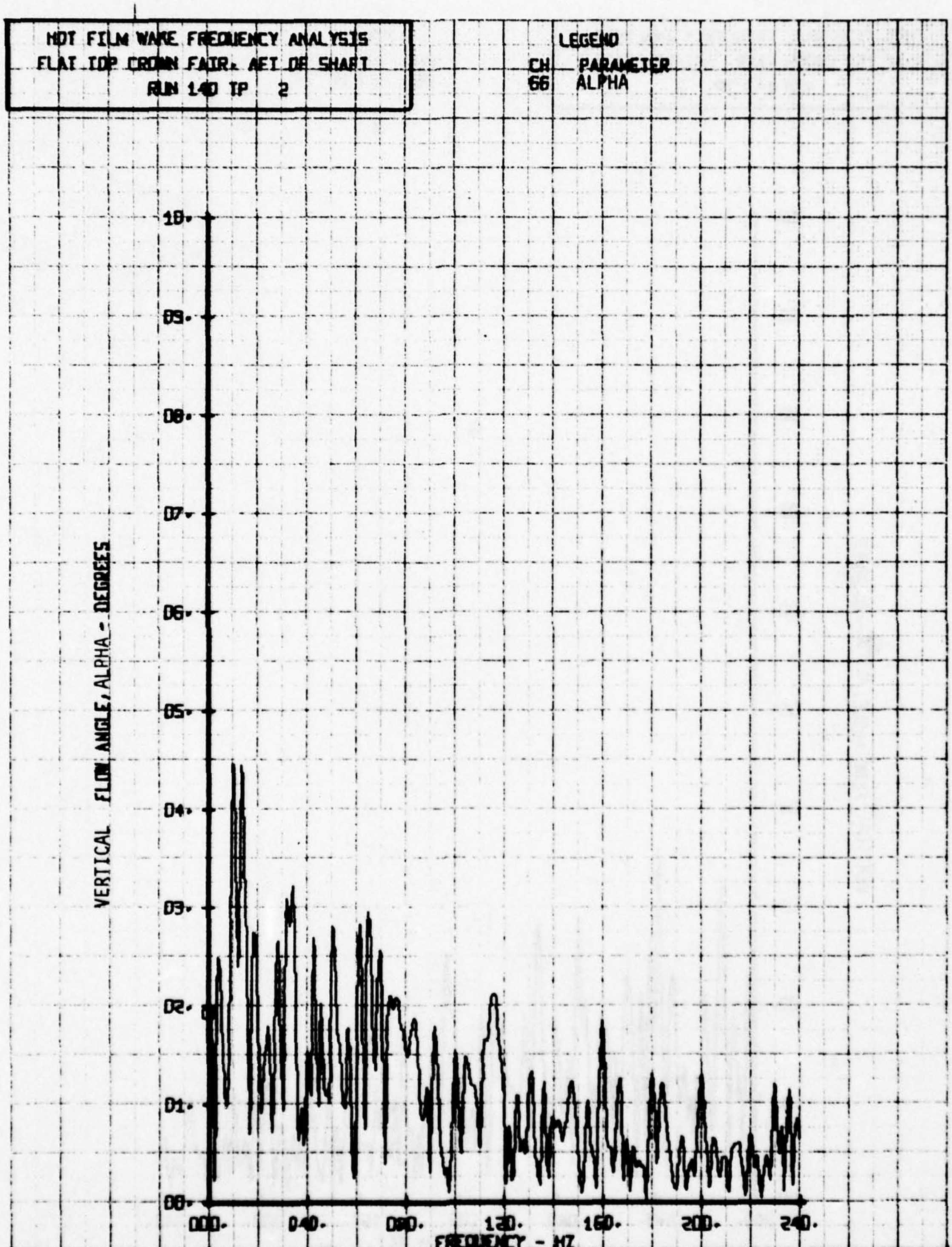
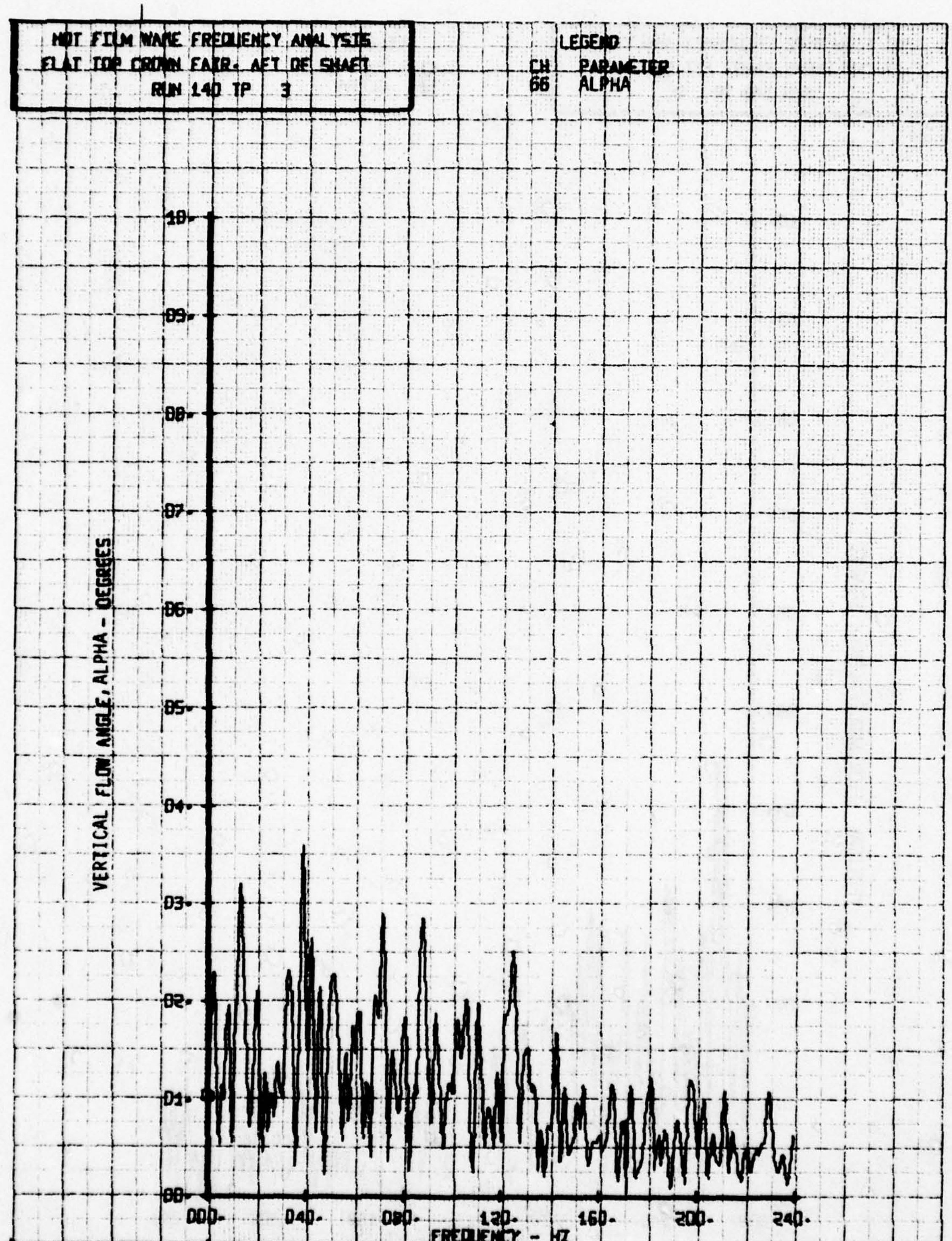
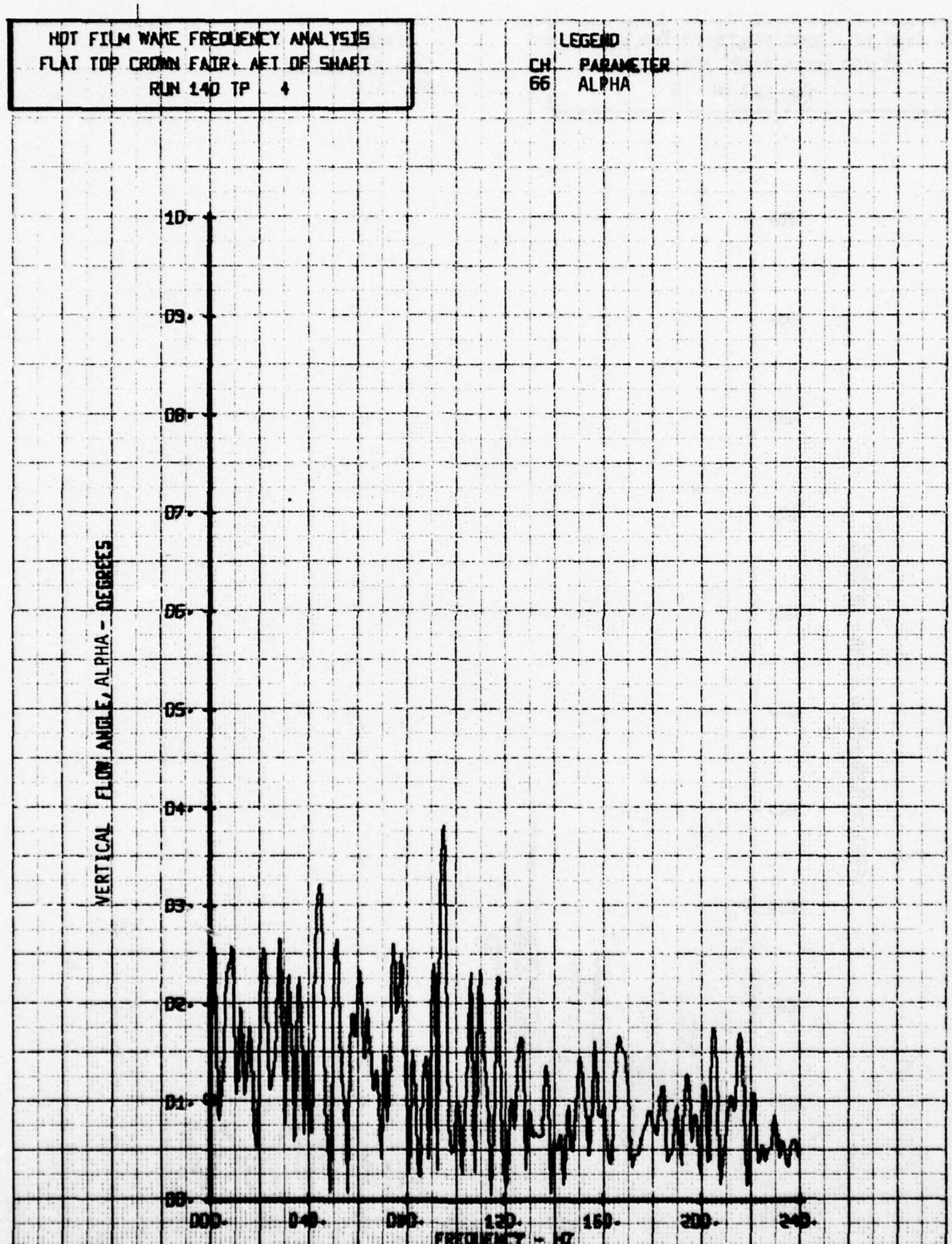


FIGURE 7 -1/4.85 SCALE MODEL GEOMETRY AND SURFACE PRESSURE TRANSDUCER LOCATIONS


HOT FILM WAKE FREQUENCY ANALYSIS
FLAT TOP CROWN FAIR. AFT OF SHAFT
RUN 140 TP 2
LEGEND
CH PARAMETER
66 ALPHA
VERTICAL FLOW ANGLE, ALPHA - DEGREES
FREQUENCY - HZ
10.
09.
08.
07.
06.
05.
04.
03.
02.
01.
00.
000.
040.
080.
120.
160.
200.
240.


HOT FILM WAKE FREQUENCY ANALYSIS
FLAT TOP CROWN FAIR. AFT OF SHAFT
RUN 140 TP 3
LEGEND
CH PARAMETER
66 ALPHA
VERTICAL FLOW ANGLE, ALPHA - DEGREES
10
09
08
07
06
05
04
03
02
01
00
000
040
080
120
160
200
240
FREQUENCY - HZ


HOT FILM WAKE FREQUENCY ANALYSIS
FLAT TOP CROWN FAIR. AFT OF SHAFT
RUN 140 TP 4
LEGEND
CH PARAMETER
66 ALPHA
VERTICAL FLOW ANGLE, ALPHA - DEGREES
10.
09.
08.
07.
06.
05.
04.
03.
02.
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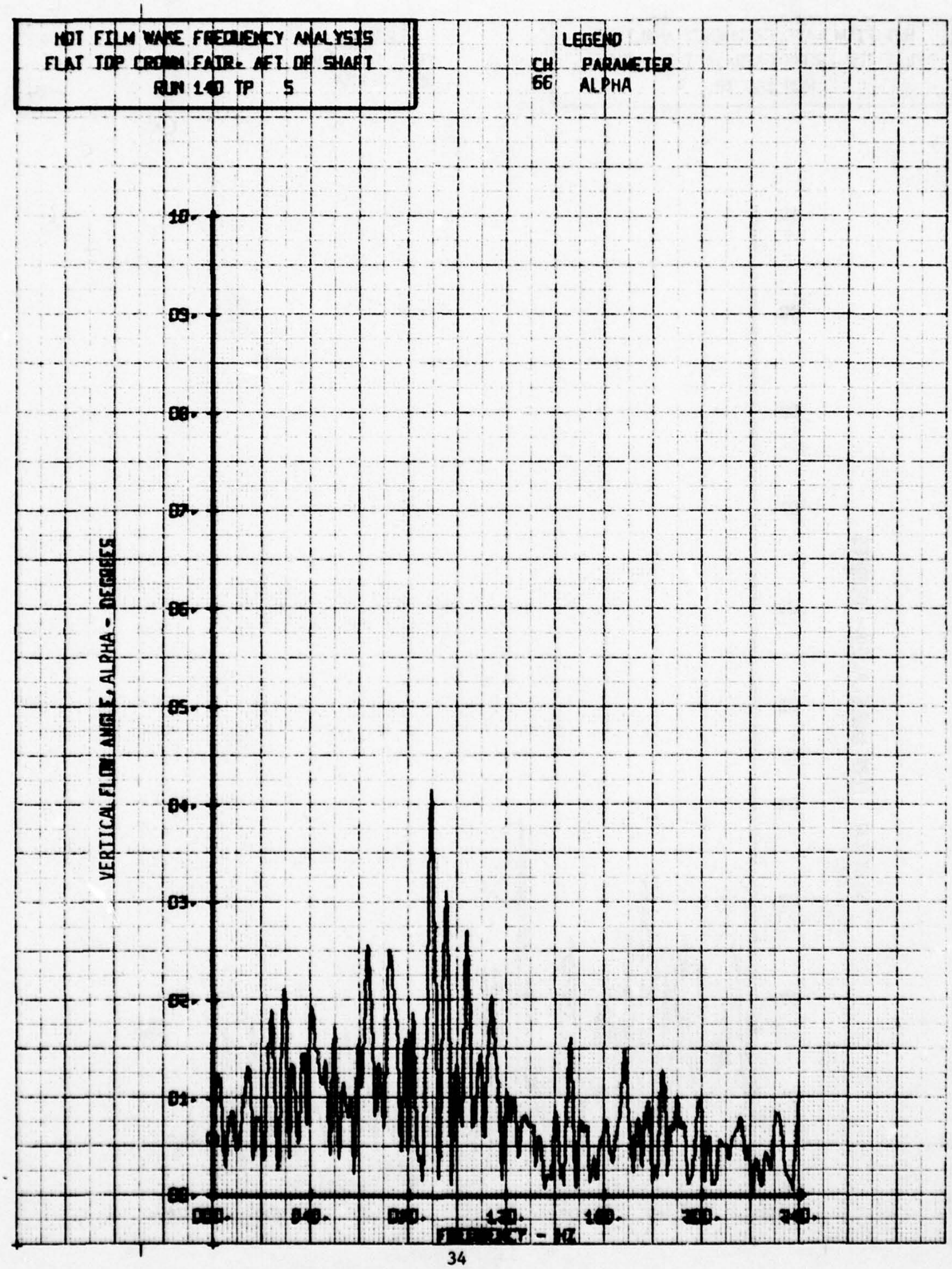
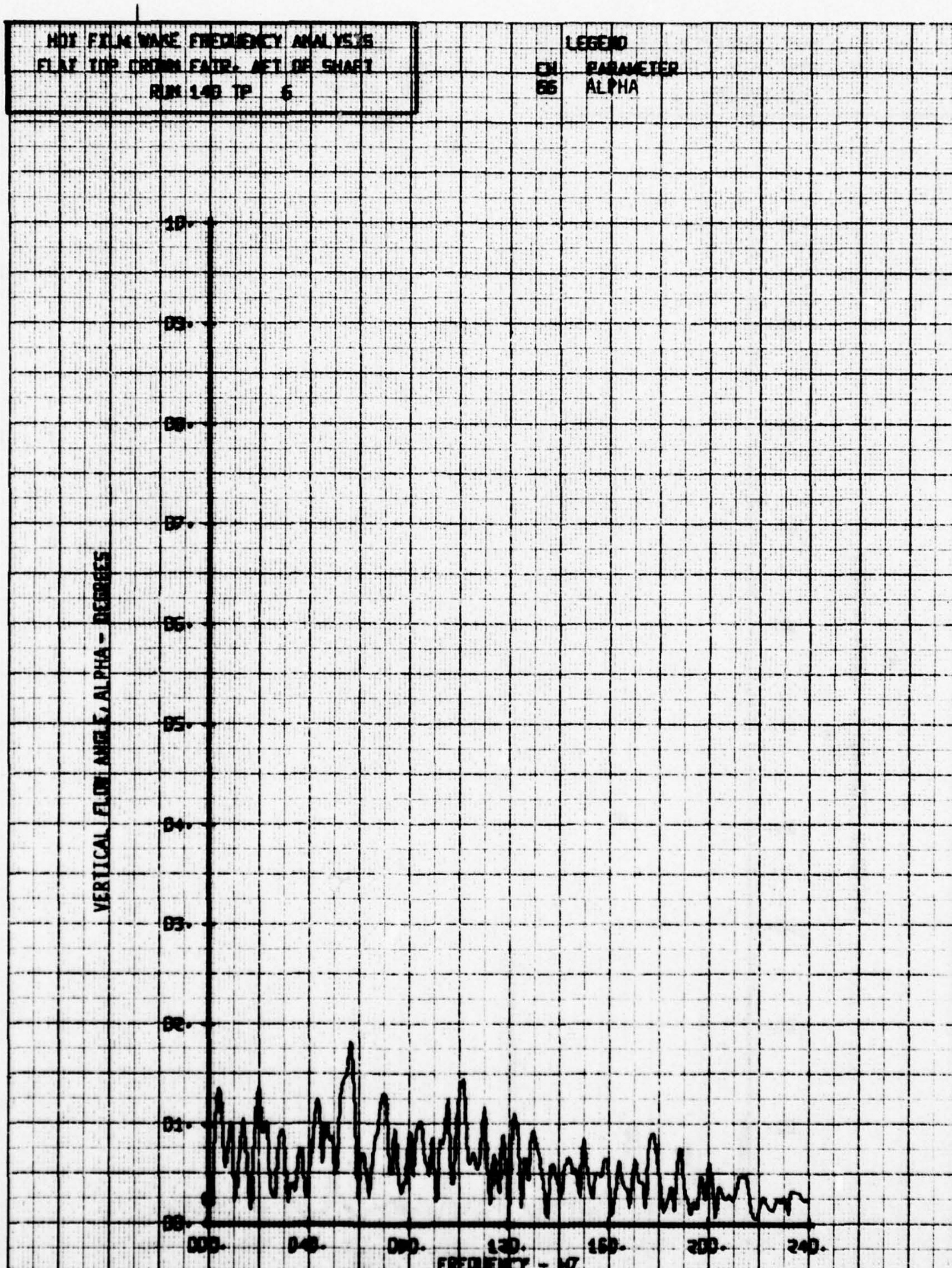
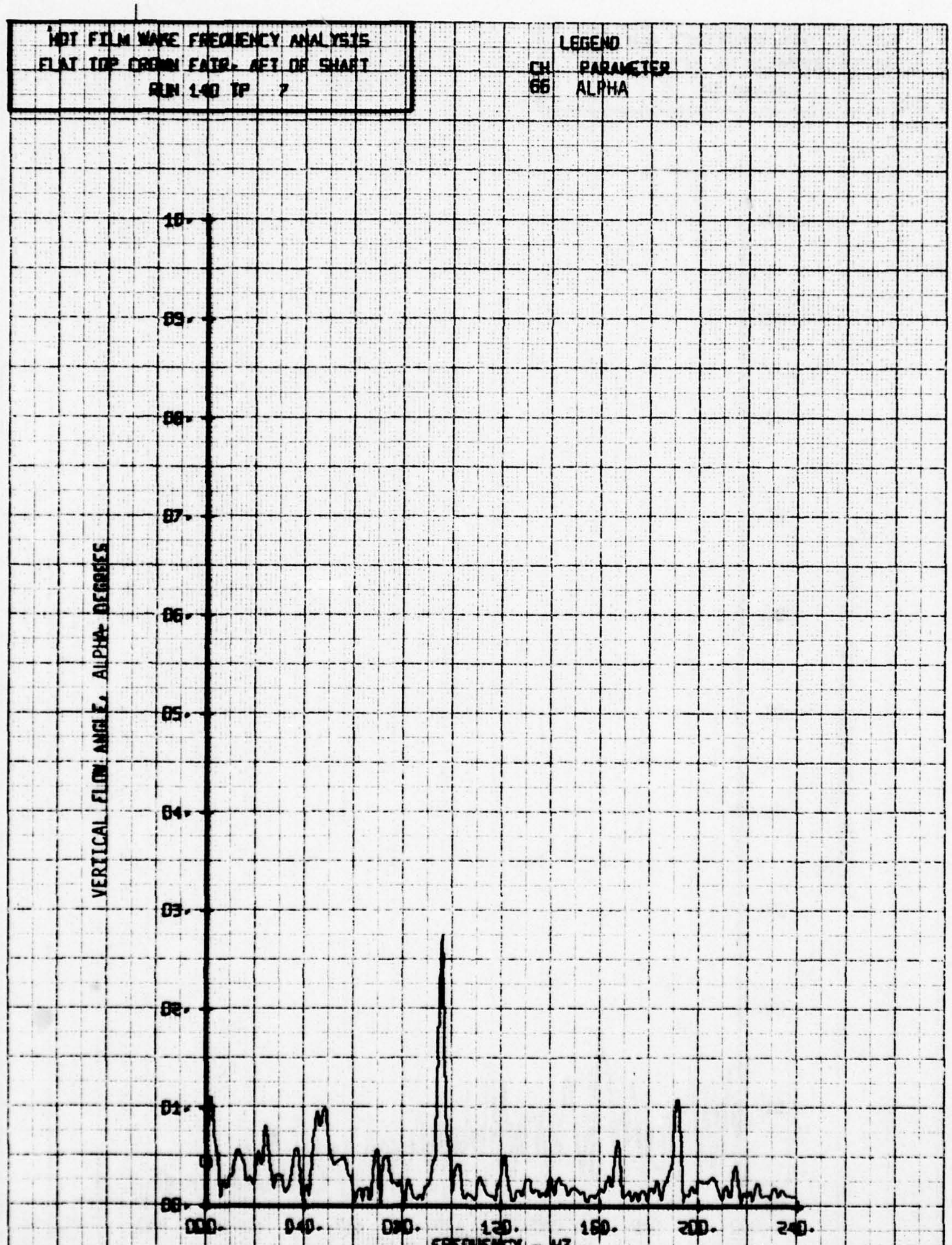
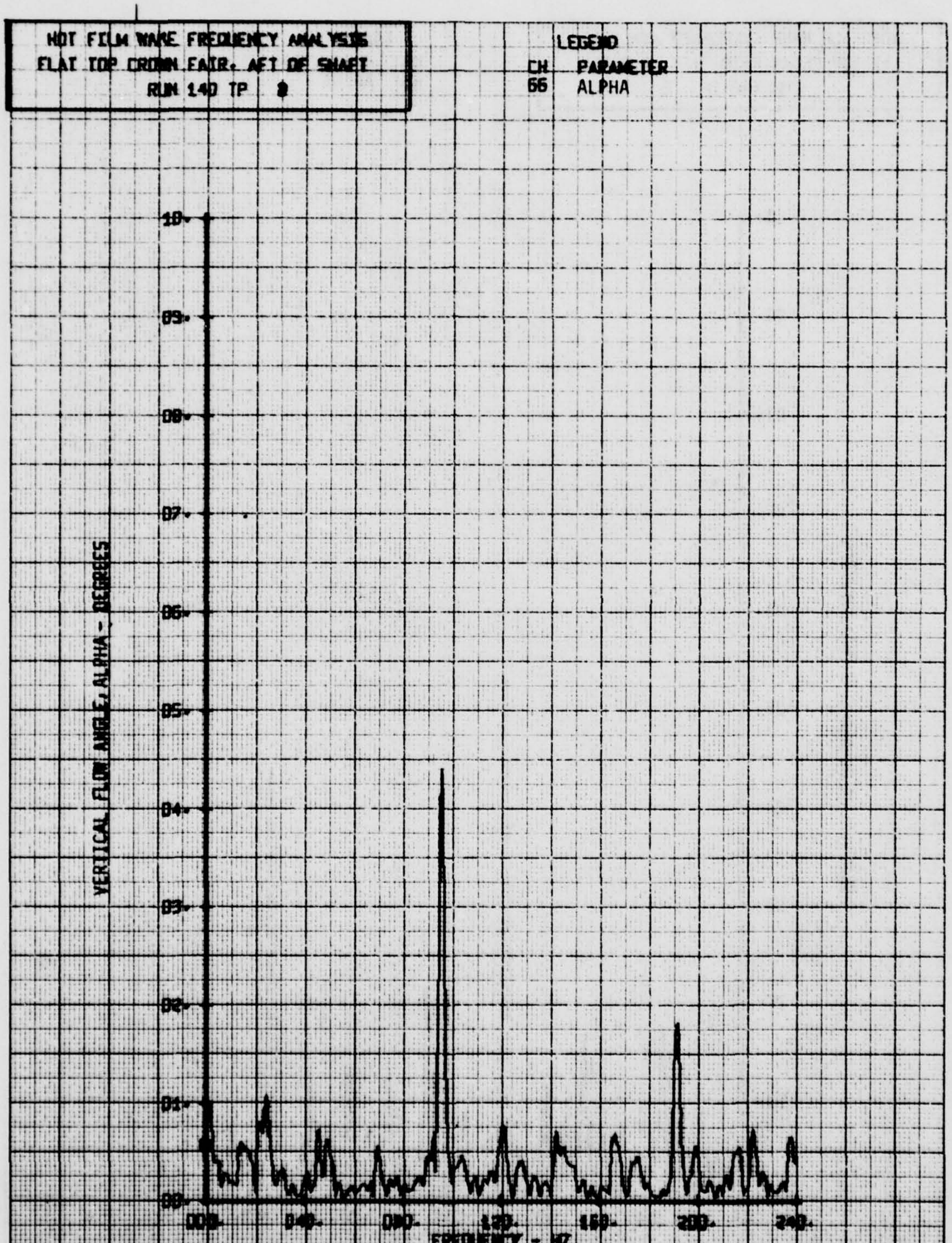
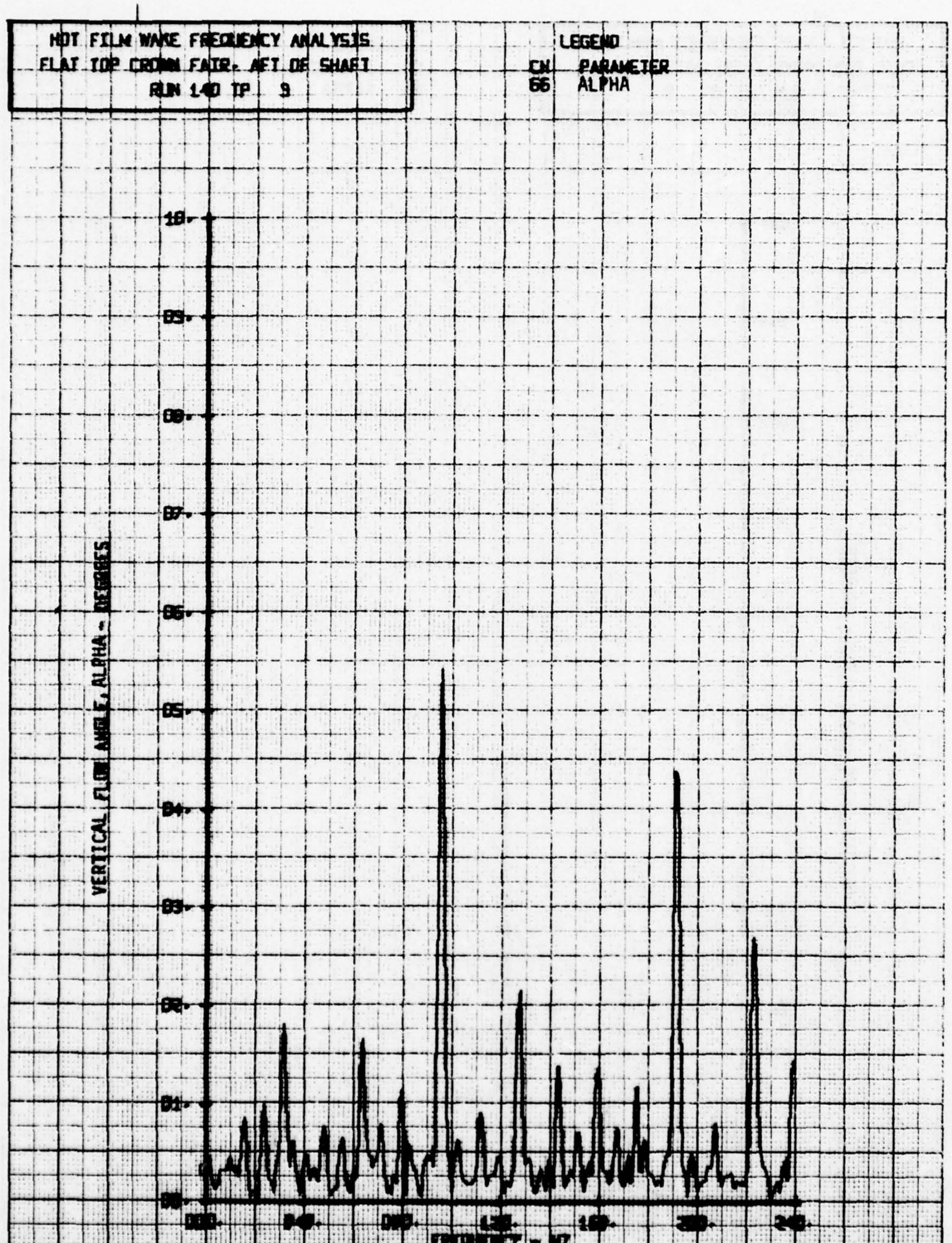
000.
040.
080.
120.
160.
200.
240.
FREQUENCY - HZ

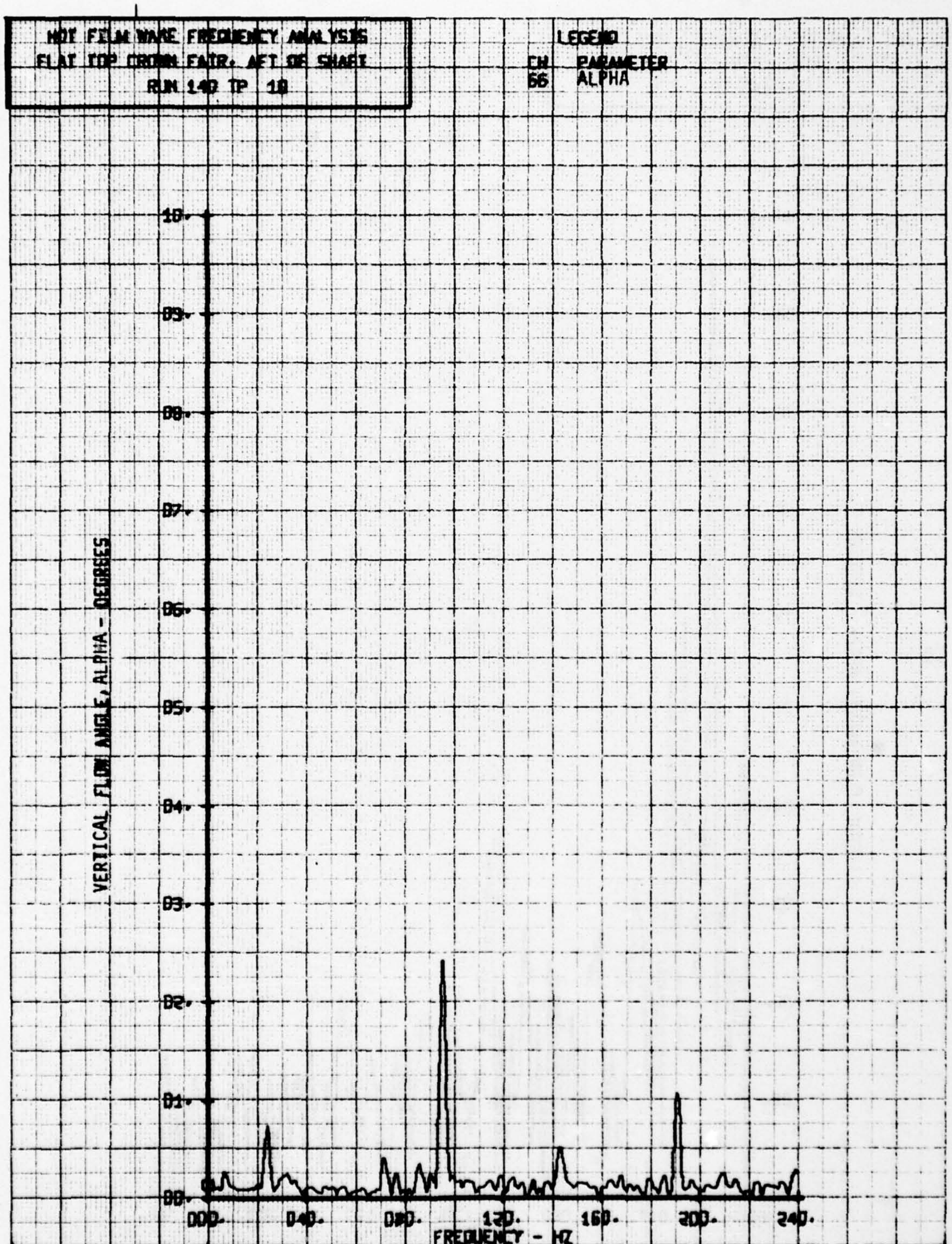

HOT FILM WAKE FREQUENCY ANALYSIS
FLAT TOP CROWN FAIR. AFT OF SHAFT
RUN 140 TP 5
LEGEND
CH PARAMETER
66 ALPHA
VERTICAL FLOW ANGLE, ALPHA - DEGREES
FREQUENCY - HZ

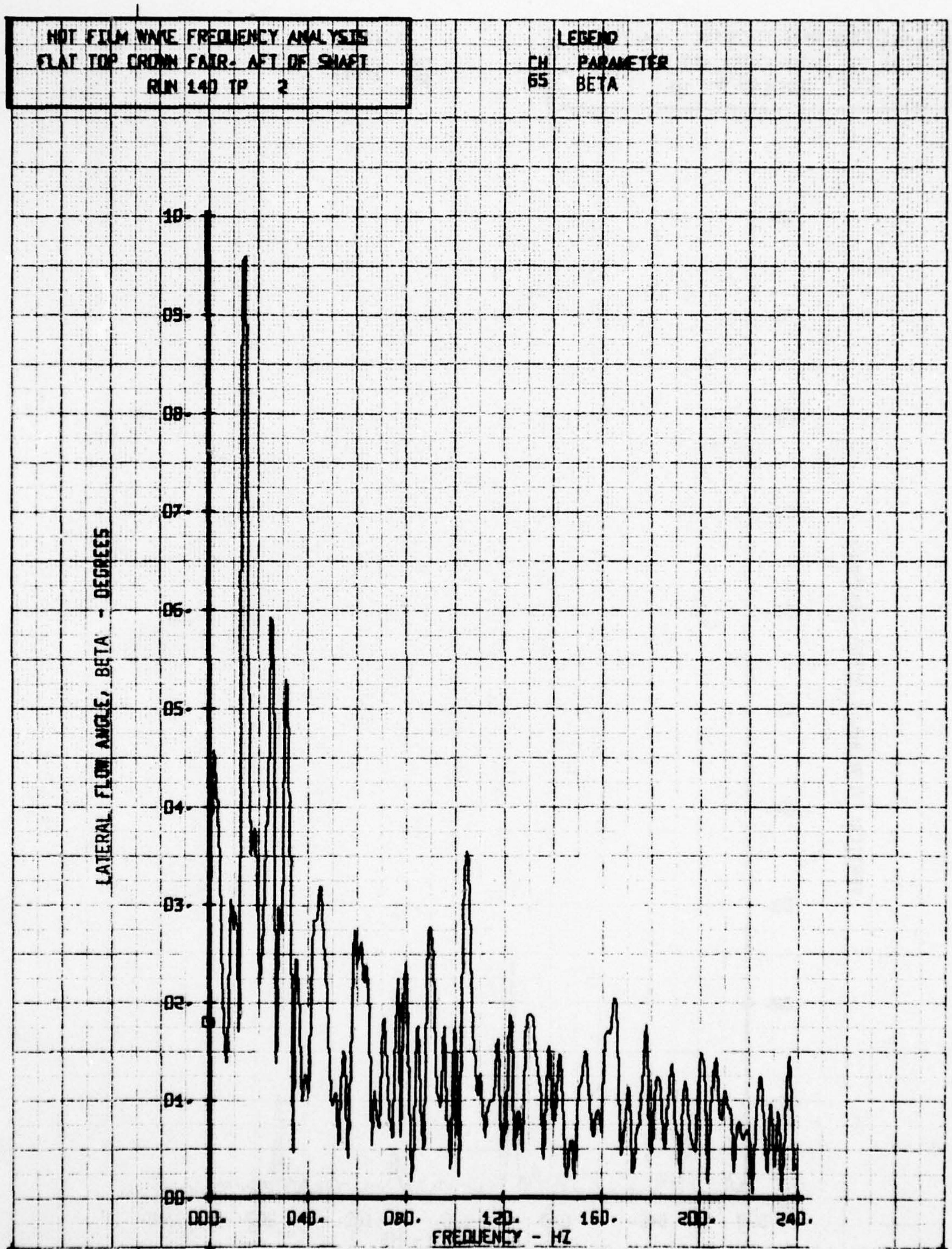

HOT FILM WAKE FREQUENCY ANALYSIS
FLAT TOP CROWN FAIR. AFT OF SHAFT
RUN 140 TP 6
LEGEND
CH PARAMETER
66 ALPHA
VERTICAL FLOW ANGLE, ALPHA - DEGREES
10
09
08
07
06
05
04
03
02
01
00
000
040
080
120
160
200
240
FREQUENCY - HZ


HOT FILM WAKE FREQUENCY ANALYSIS
FLAT TOP CROWN FAIR. AFT OF SHAFT
RUN 140 TP 7
LEGEND
CH PARAMETER
66 ALPHA
VERTICAL FLOW ANGLE, ALPHA- DEGREES
FREQUENCY - HZ

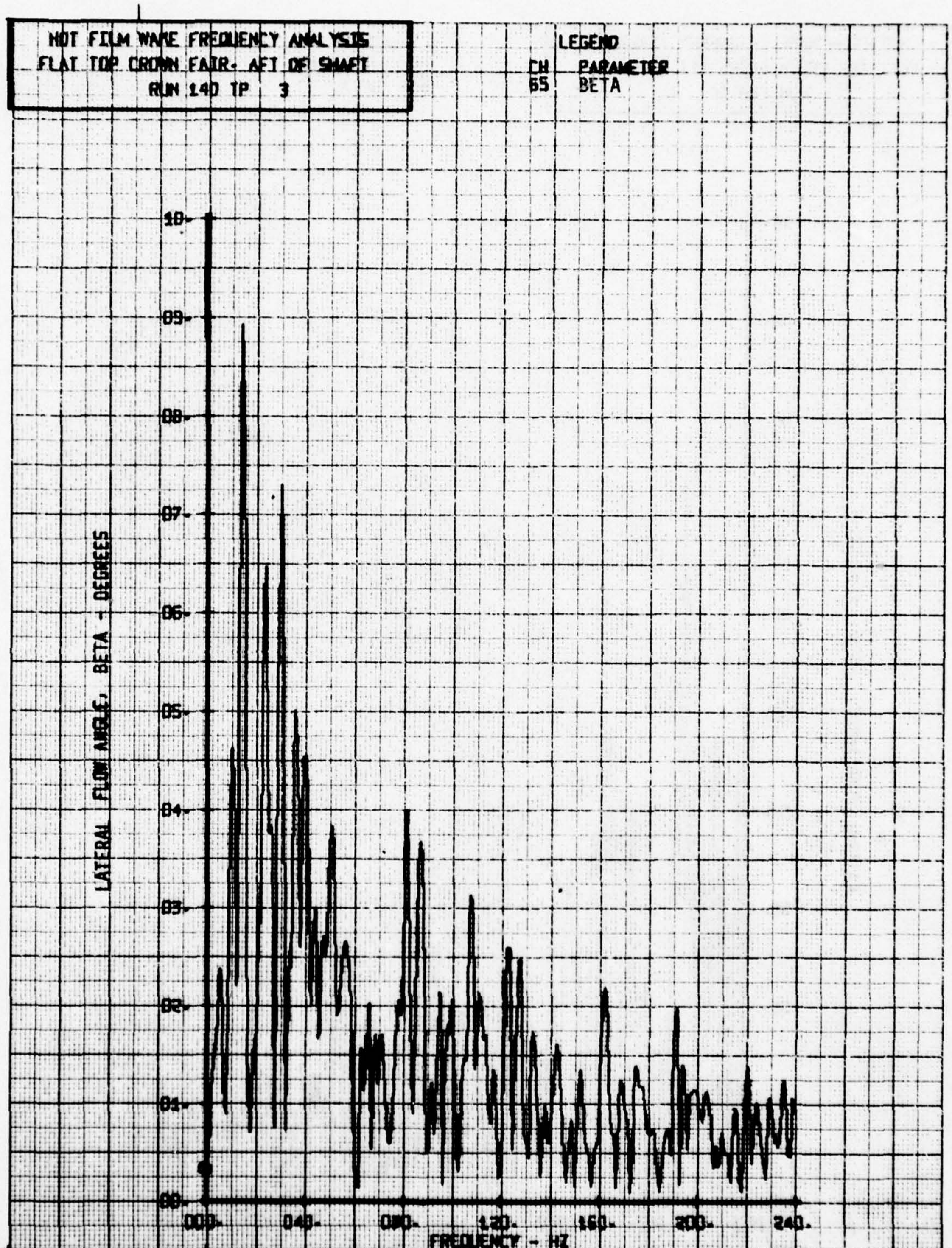

HOT FILM WAKE FREQUENCY ANALYSIS
FLAT TOP CROWN FAIR. AFT OF SHAFT
RUN 140 TP
LEGEND
CH PARAMETER
66 ALPHA
VERTICAL FLOW ANGLE, ALPHA - DEGREES
FREQUENCY - HZ


HOT FILM WAKE FREQUENCY ANALYSIS
FLAT TOP CROWN FAIR. AFT OF SHAFT
RUN 140 TP 9
LEGEND
CN PARAMETER
66 ALPHA
VERTICAL FLOW ANGLE, ALPHA - DEGREES
FREQUENCY - HZ


HOT FILM WAKE FREQUENCY ANALYSIS
FLAT TOP CROWN FAIR. AFT OF SHAFT
RUN 140 TP 10
LEGEND
CH PARAMETER
66 ALPHA
VERTICAL FLOW ANGLE, ALPHA - DEGREES
FREQUENCY - HZ



HOT FILM WAKE FREQUENCY ANALYSIS
FLAT TOP CROWN FAIR- AFT OF SHAFT
RUN 140 TP 2
LEGEND
CH PARAMETER
65 BETA
LATERAL FLOW ANGLE, BETA - DEGREES
10-
09-
08-
07-
06-
05-
04-
03-
02-
01-
00-
000.
040.
080.
120.
160.
200.
240.
FREQUENCY - HZ



HOT FILM WAKE FREQUENCY ANALYSIS
FLAT TOP CROWN FAIR. AFT OF SHAFT
RUN 140 TP 3
LEGEND
CH PARAMETER
65 BETA
LATERAL FLOW ANGLE, BETA - DEGREES
10.
09.
08.
07.
06.
05.
04.
03.
02.
01.
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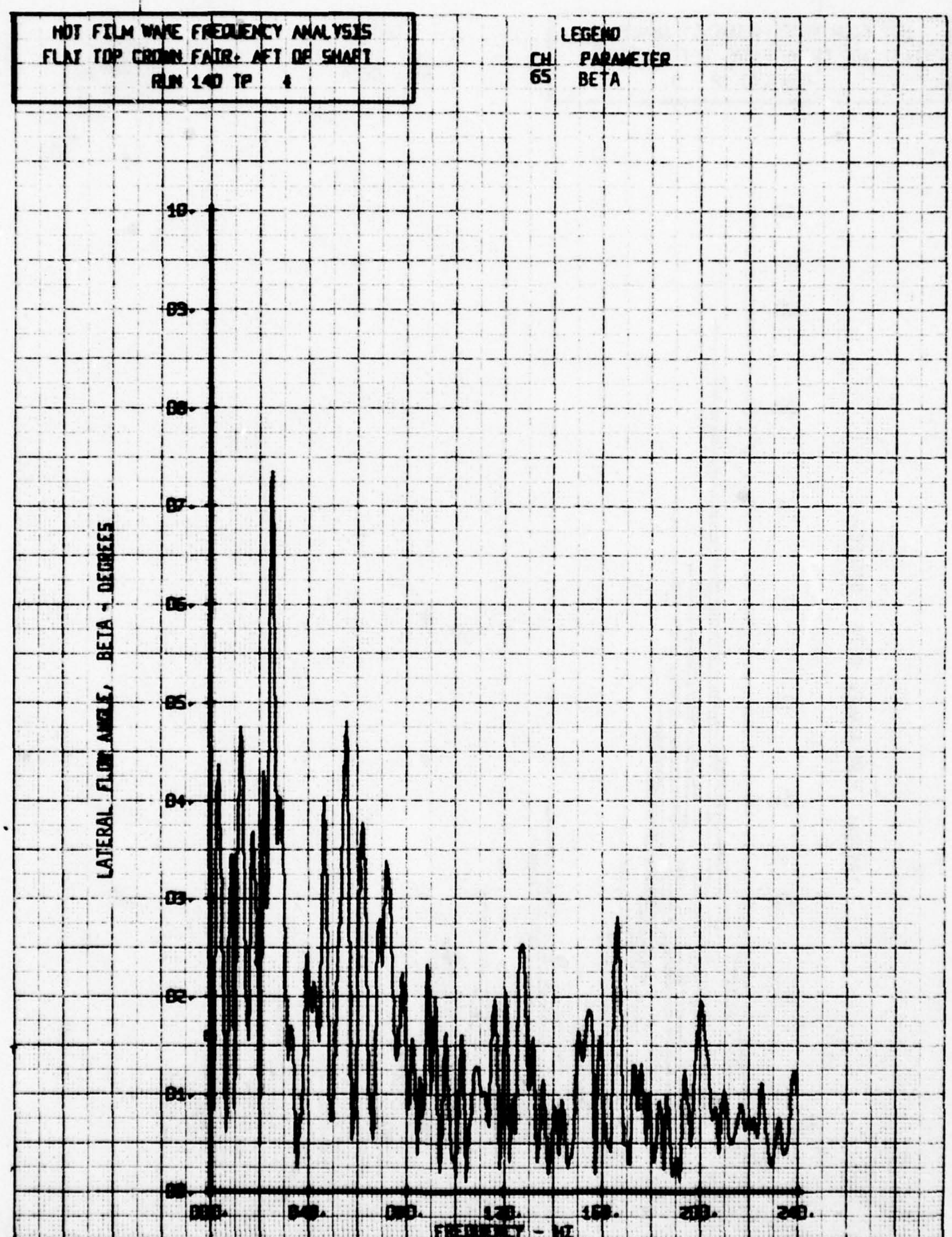
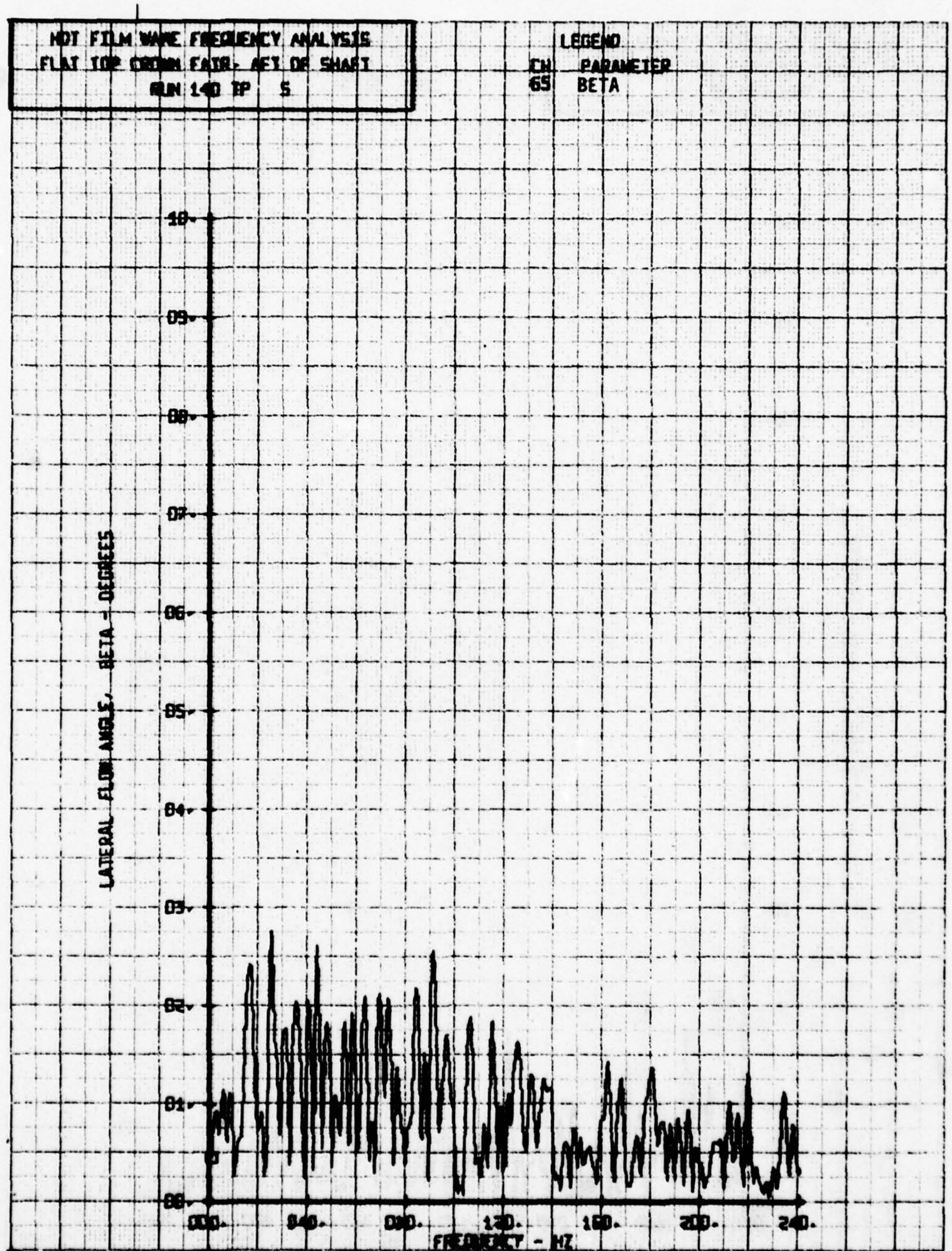
040.
080.
120.
160.
200.
240.
FREQUENCY - HZ


HOT FILM VANE FREQUENCY ANALYSIS
FLAT TOP CROWN FAIR. AFT OF SHAFT
RUN 140 TP 4
LEGEND
CH PARAMETER
65 BETA
LATERAL FLOW ANGLE, BETA - DEGREES
FREQUENCY - HZ


HOT FILM VANE FREQUENCY ANALYSIS
FLAT TOP CROWN FAIR. AFT OF SHAFT
RUN 140 TP 5
LEGEND
CH PARAMETER
65 BETA
LATERAL FLOW ANGLE, BETA - DEGREES
10
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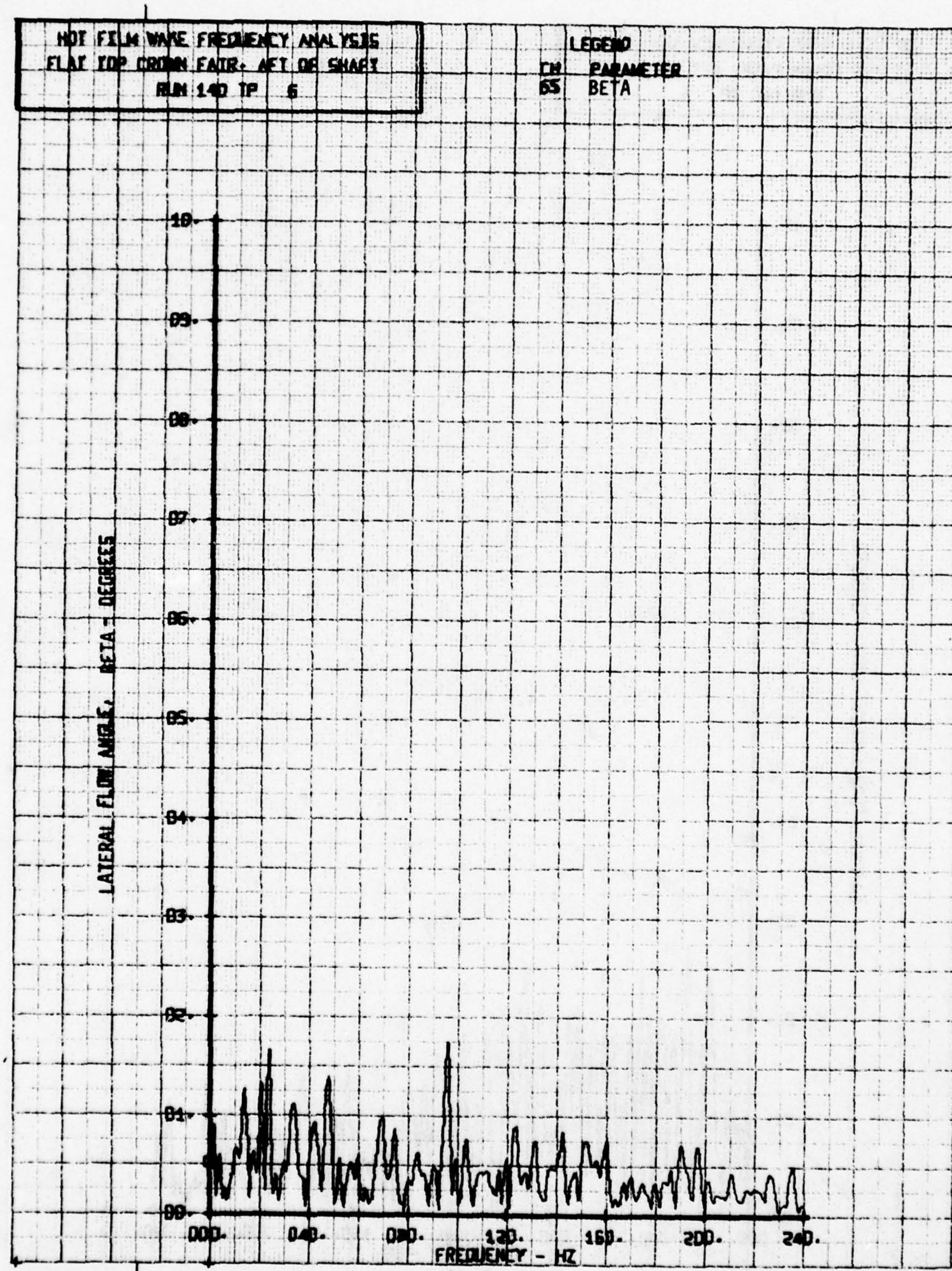
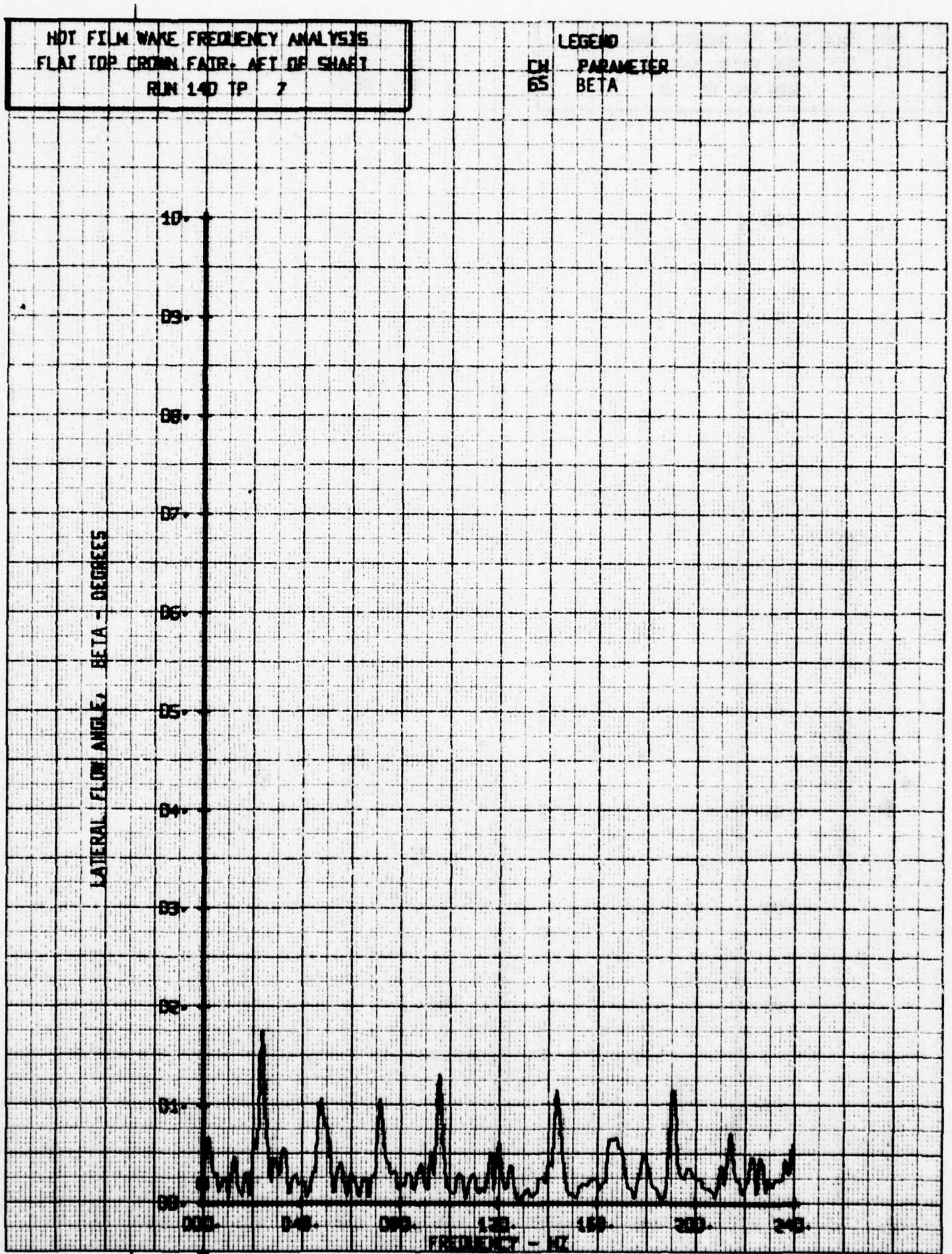
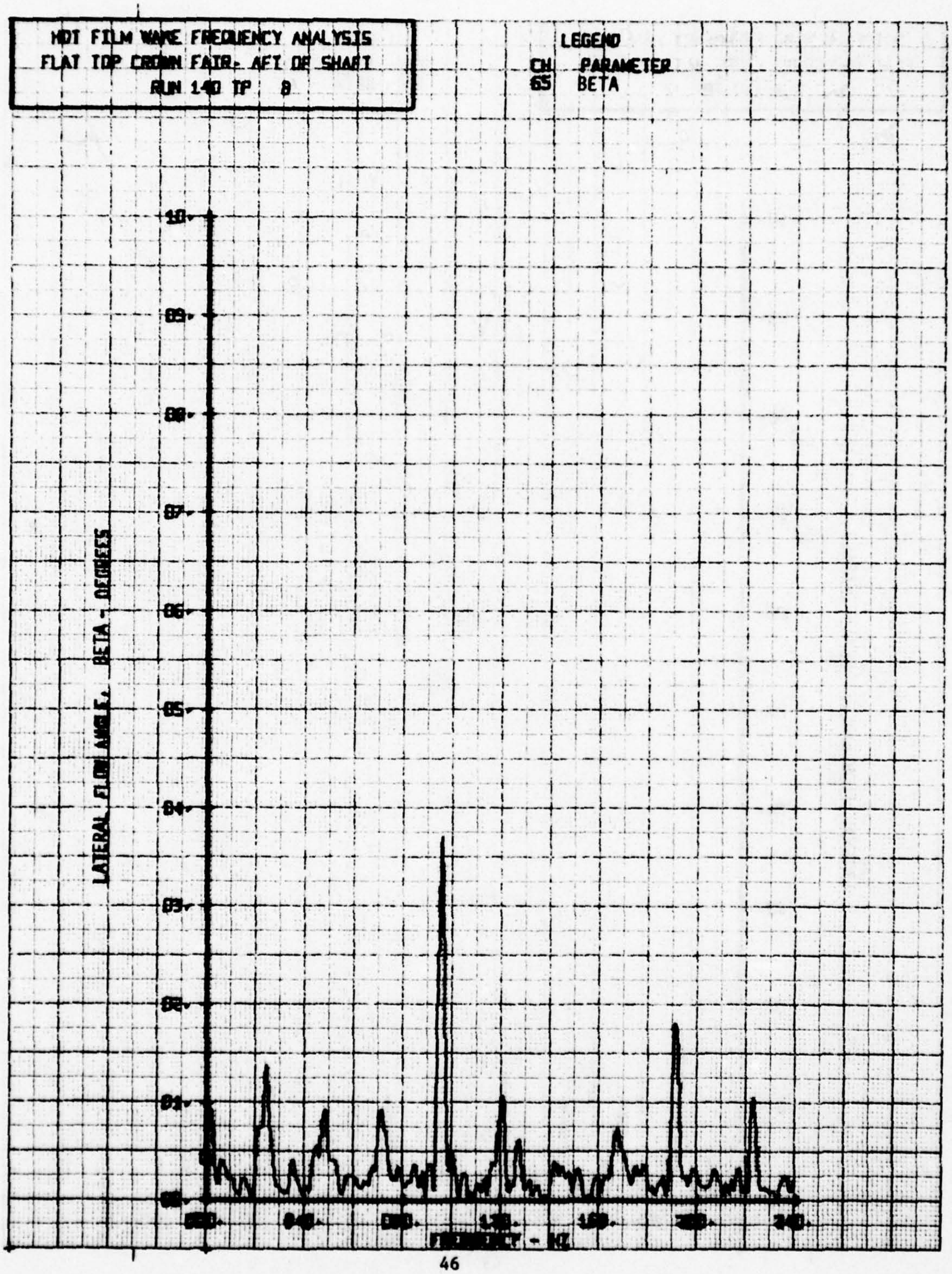
040.
080.
120.
160.
200.
240.
FREQUENCY - HZ


HOT FILM WAKE FREQUENCY ANALYSIS
FLAT TOP CROWN FAIR. AFT OF SHAFT
RUN 140 TP 6
LEGEND
CH PARAMETER
65 BETA
LATERAL FLOW ANGLE, BETA - DEGREES
FREQUENCY - HZ


HOT FILM WAKE FREQUENCY ANALYSIS
FLAT TOP CROWN FAIR. AFT OF SHAFT
RUN 140 TP 7
LEGEND
CH PARAMETER
65 BETA
LATERAL FLOW ANGLE, BETA - DEGREES
FREQUENCY - HZ


HOT FILM WAKE FREQUENCY ANALYSIS
FLAT TOP CROWN FAIR- AFT OF SHAFT
RUN 140 TP 8
LEGEND
CH PARAMETER
65 BETA
LATERAL FLOW ANGLE, BETA - DEGREES
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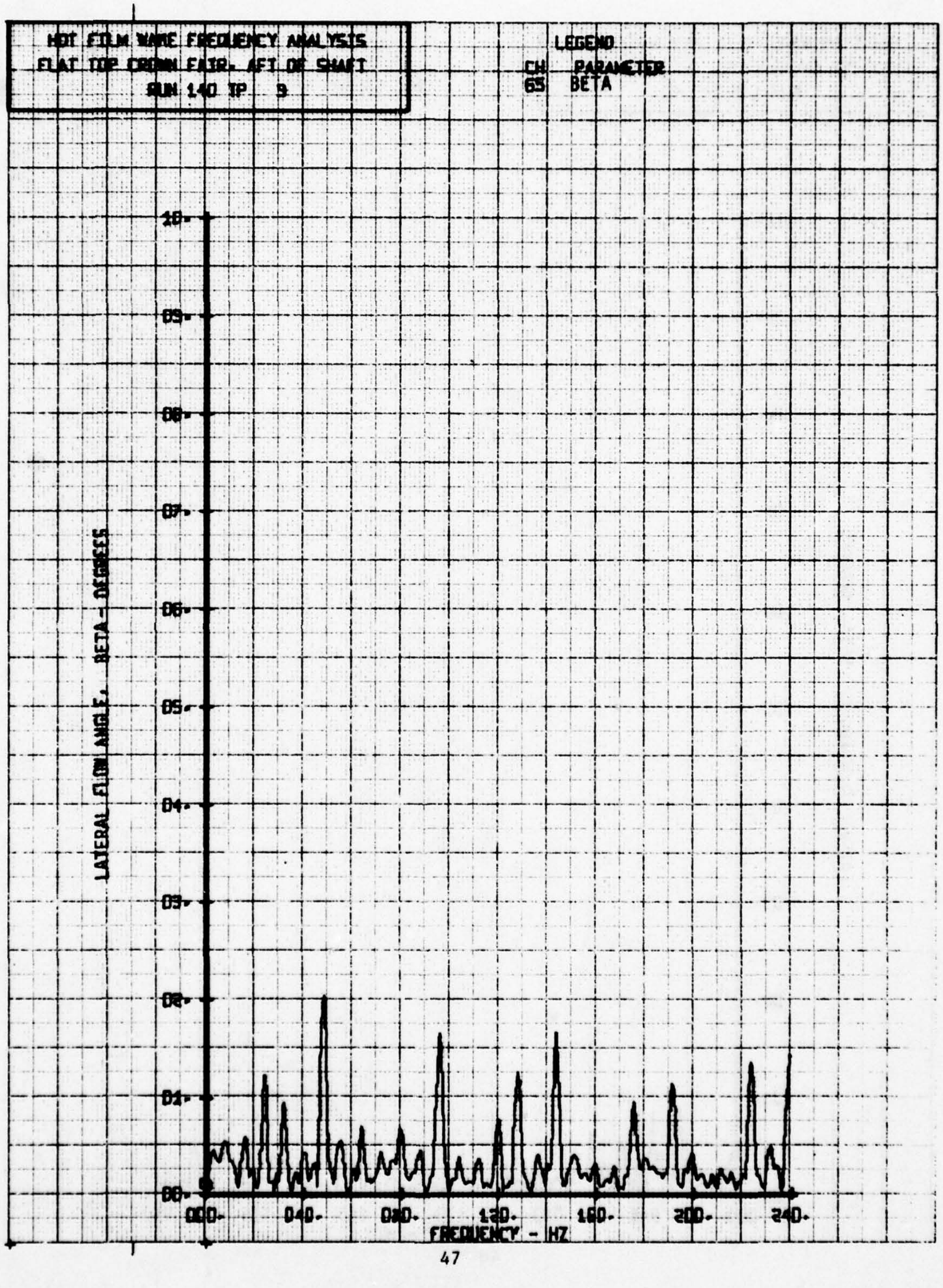
HOT FILM WAKE FREQUENCY ANALYSIS
FLAT TOP CROWN FAIR. AFT OF SHAFT
RUN 140 TP 9
LEGEND
CH PARAMETER
65 BETA
LATERAL FLOW ANGLE, BETA - DEGREES
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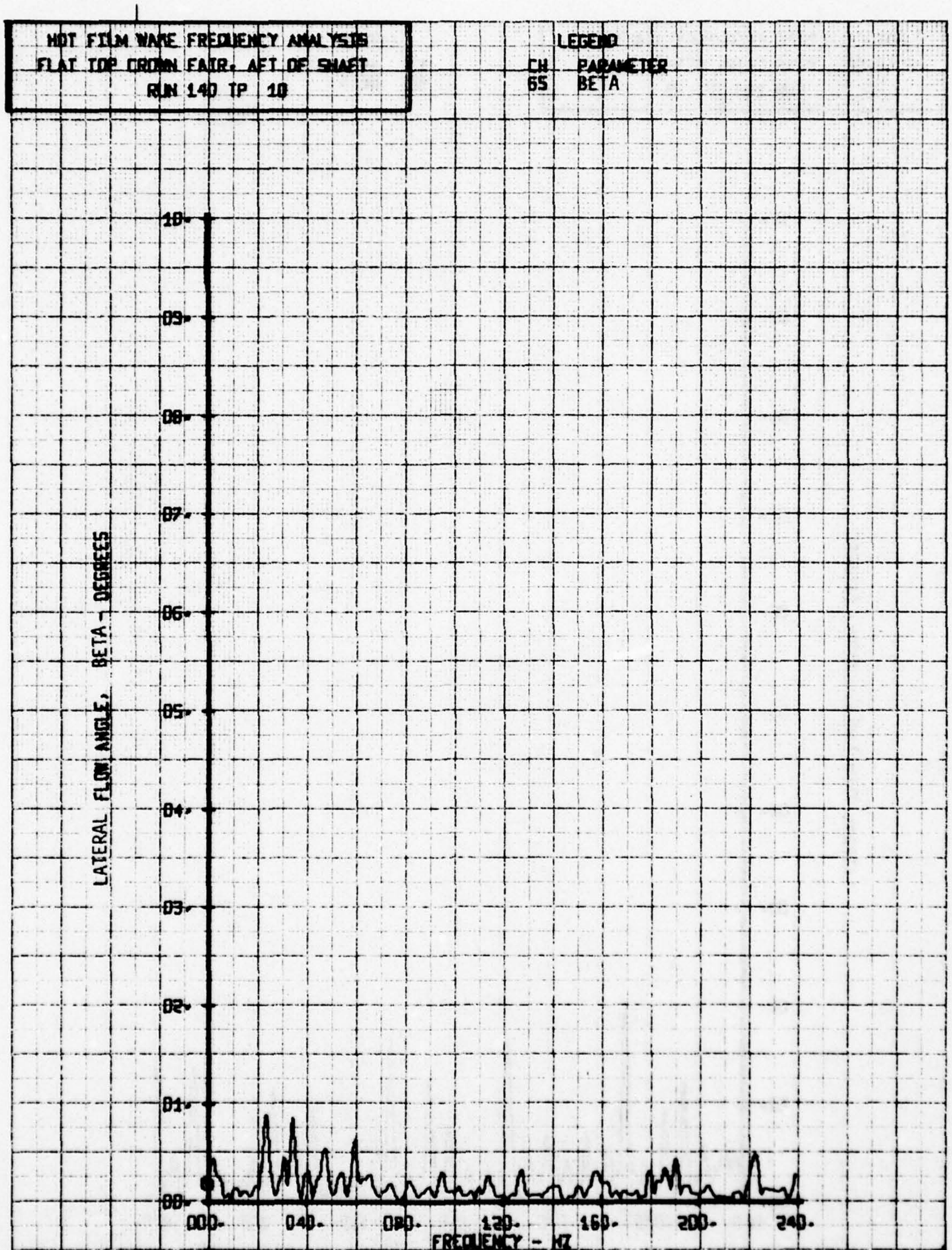
FREQUENCY - HZ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FLAT TOP CROWN FAIR. AFT OF SHAFT
RUN 140 TP 10
LEGEND
CH PARAMETER
65 BETA
LATERAL FLOW ANGLE, BETA - DEGREES
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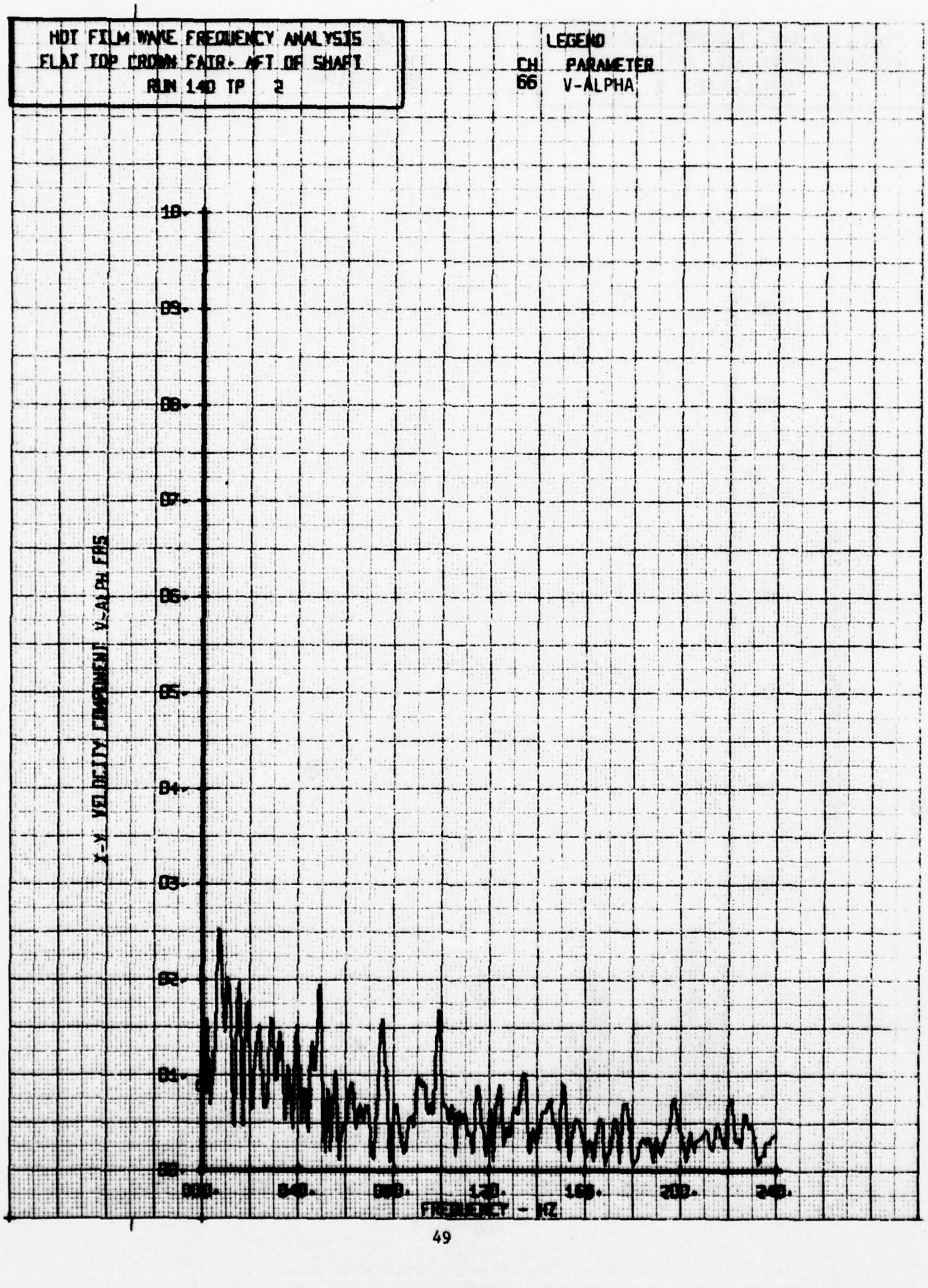
FREQUENCY - HZ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FLAT TOP CROWN FAIR. AFT OF SHAFT
RUN 140 TP 2
LEGEND
CH PARAMETER
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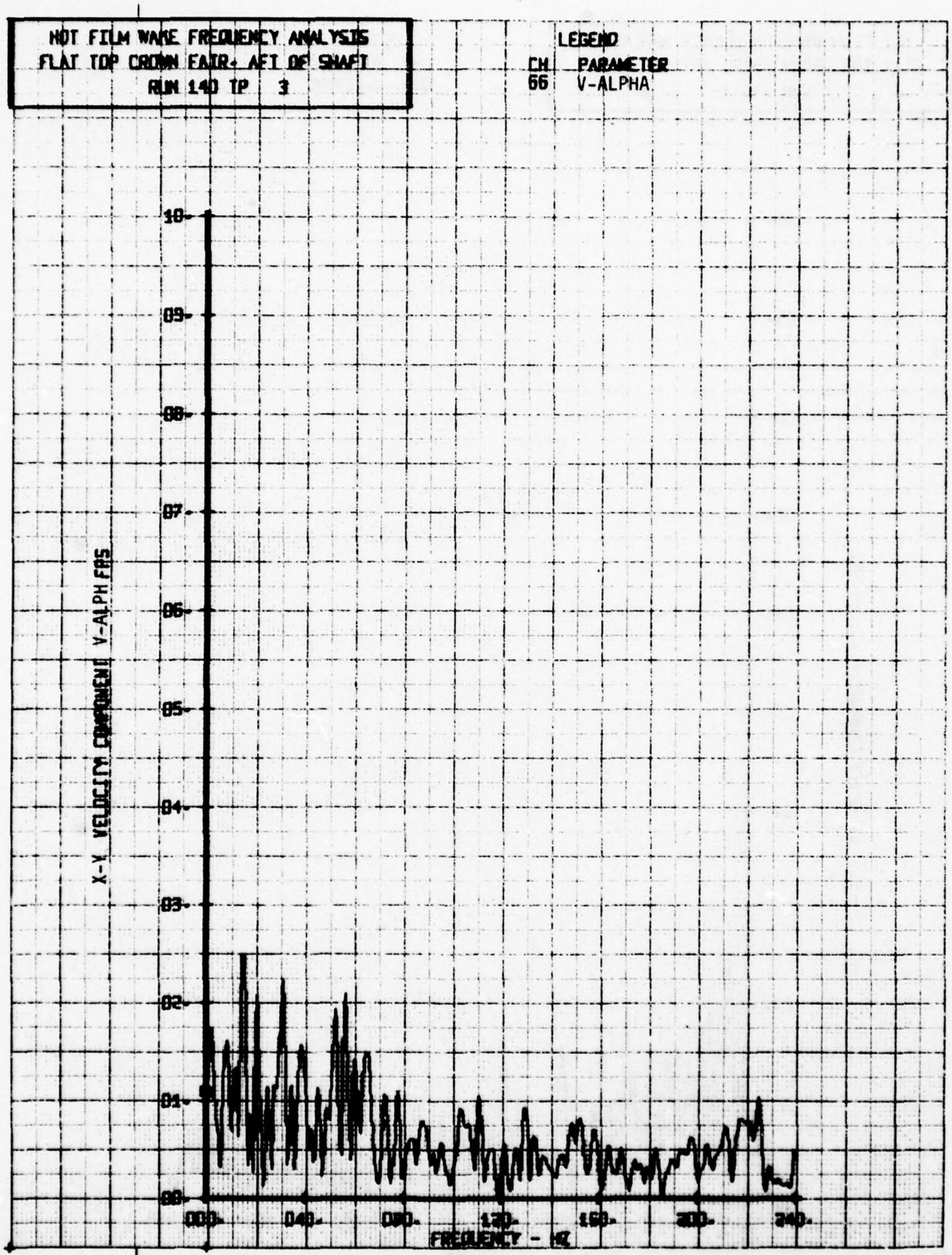
X-Y VELOCITY COMPONENT V-ALPH FPS
FREQUENCY - HZ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FLAT TOP CROWN FAIR. AFT OF SHAFT
RUN 140 TP 3
LEGEND
CH PARAMETER
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X-Y VELOCITY COMPONENT V-ALPH FPS
FREQUENCY - HZ
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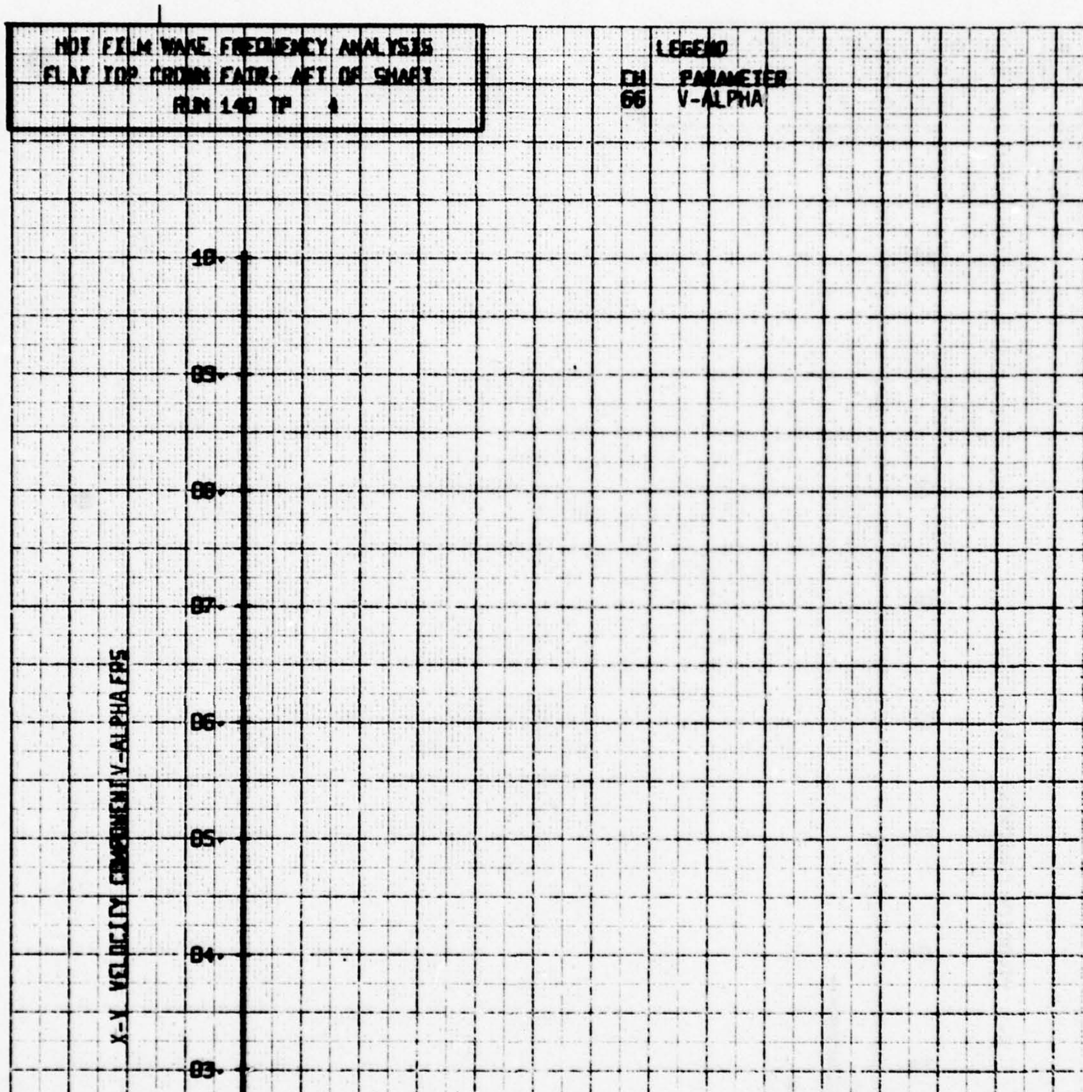
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FLAT TOP CROWN FAIR. AFT OF SHAFT
RUN 140 TP 4
LEGEND
CH PARAMETER
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X-Y VELOCITY COMPONENT V-ALPHA FPS
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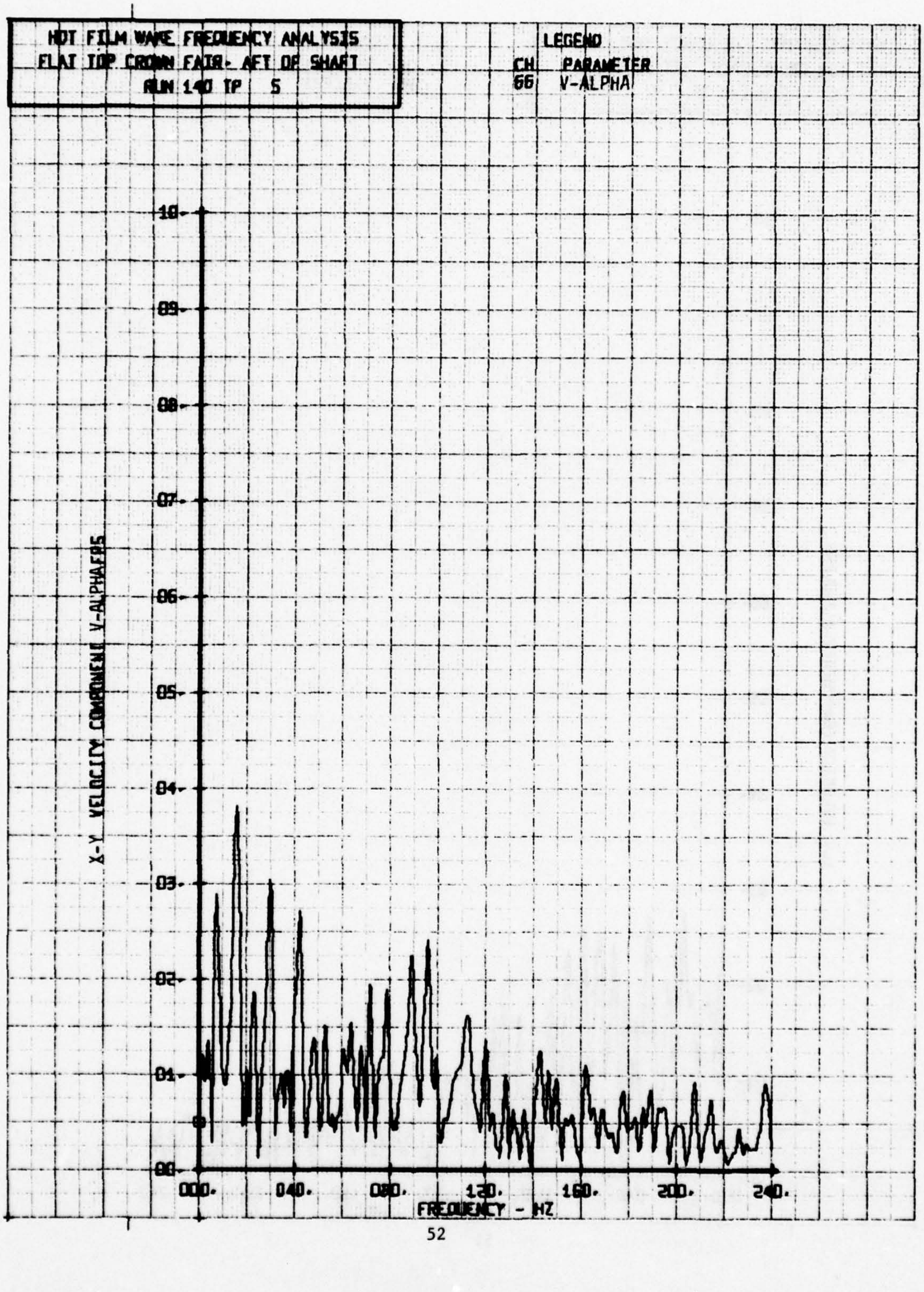
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FLAT TOP CROWN FAIR- AFT OF SHAFT
RUN 140 TP 5
LEGEND
CH PARAMETER
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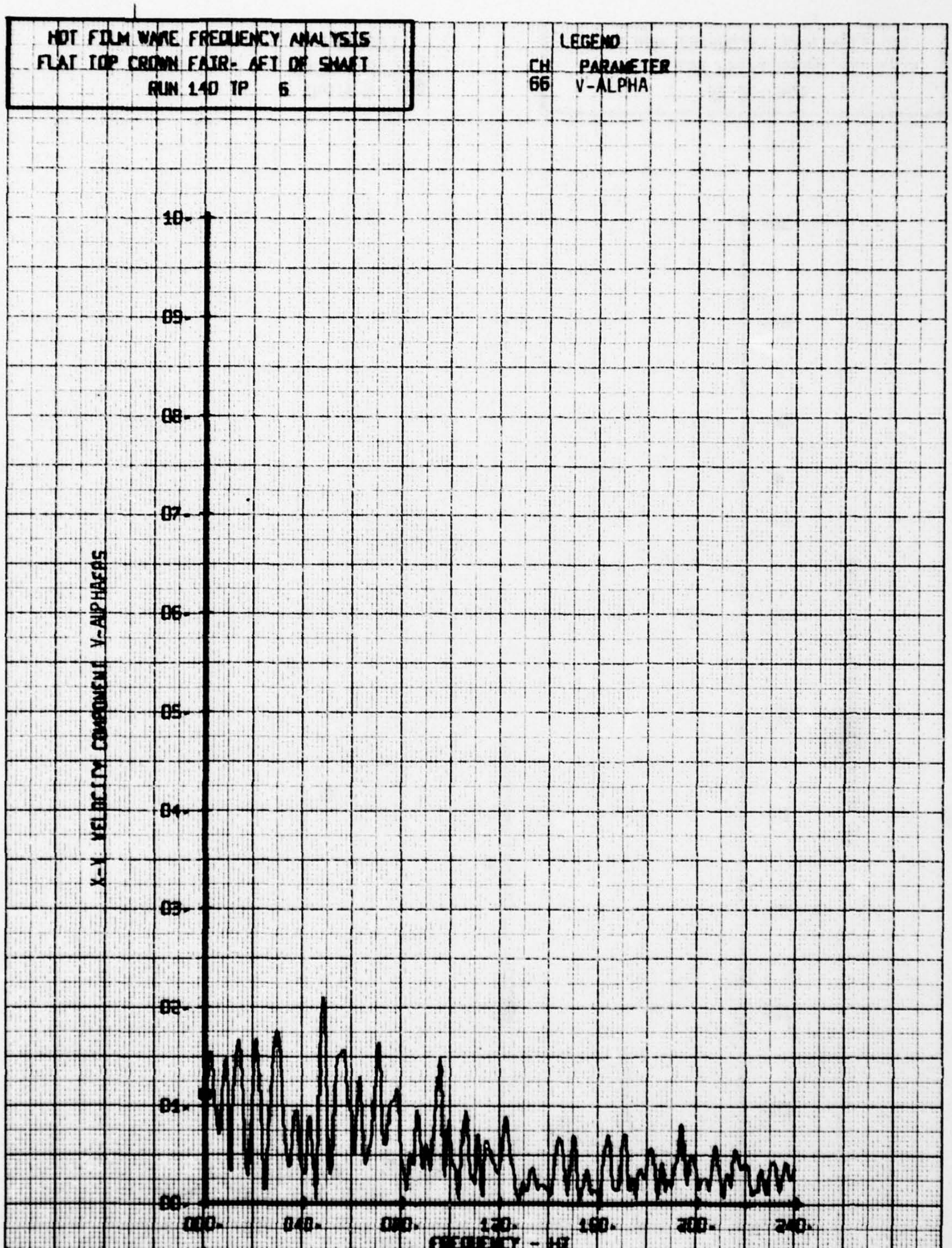
X-Y VELOCITY COMPONENT V-ALPHAFPS
FREQUENCY - HZ



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FLAT TOP CROWN FAIR- AFT OF SHAFT
RUN 140 TP 6
LEGEND
CH PARAMETER
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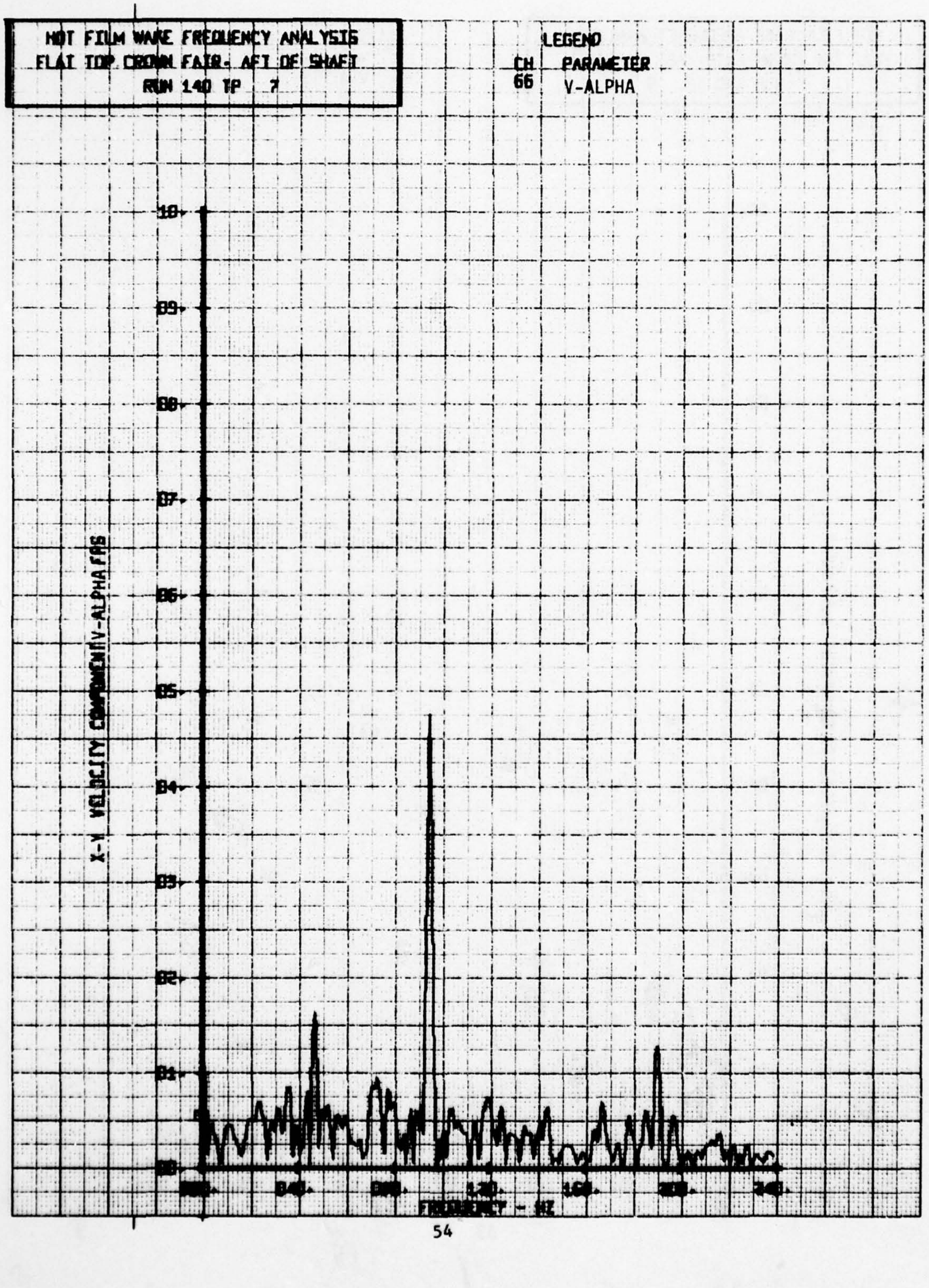
X-Y VELOCITY COMPONENT V-ALPHAERS
FREQUENCY - HZ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FLAT TOP CROWN FAIR- AFT OF SHAFT
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LEGEND
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X-Y VELOCITY COMPONENT V-ALPHA FAS
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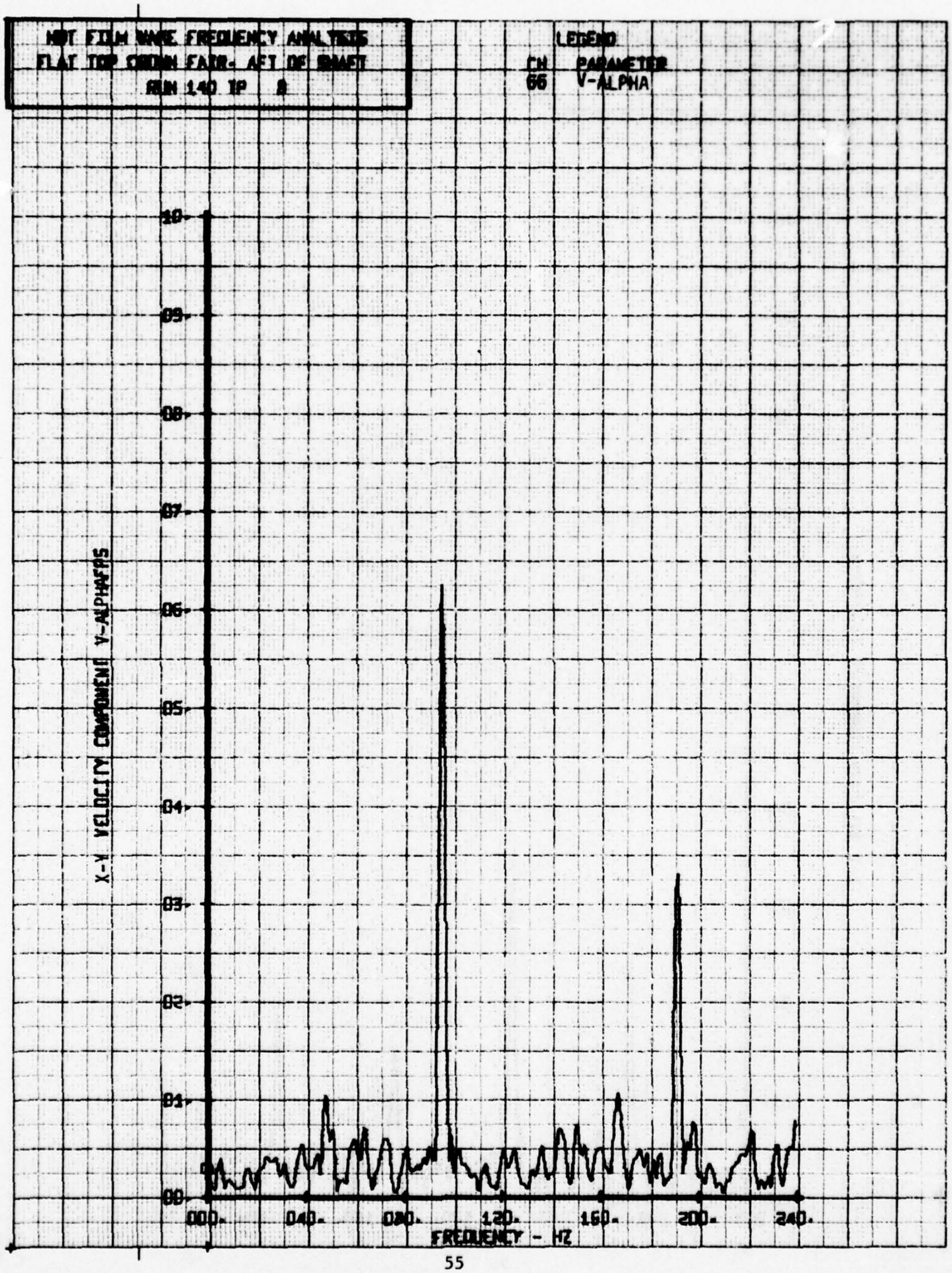

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FLAT TOP CROWN FAIR- AFT OF SHAFT
RUN 140 TP 8
LEGEND
CN PARAMETER
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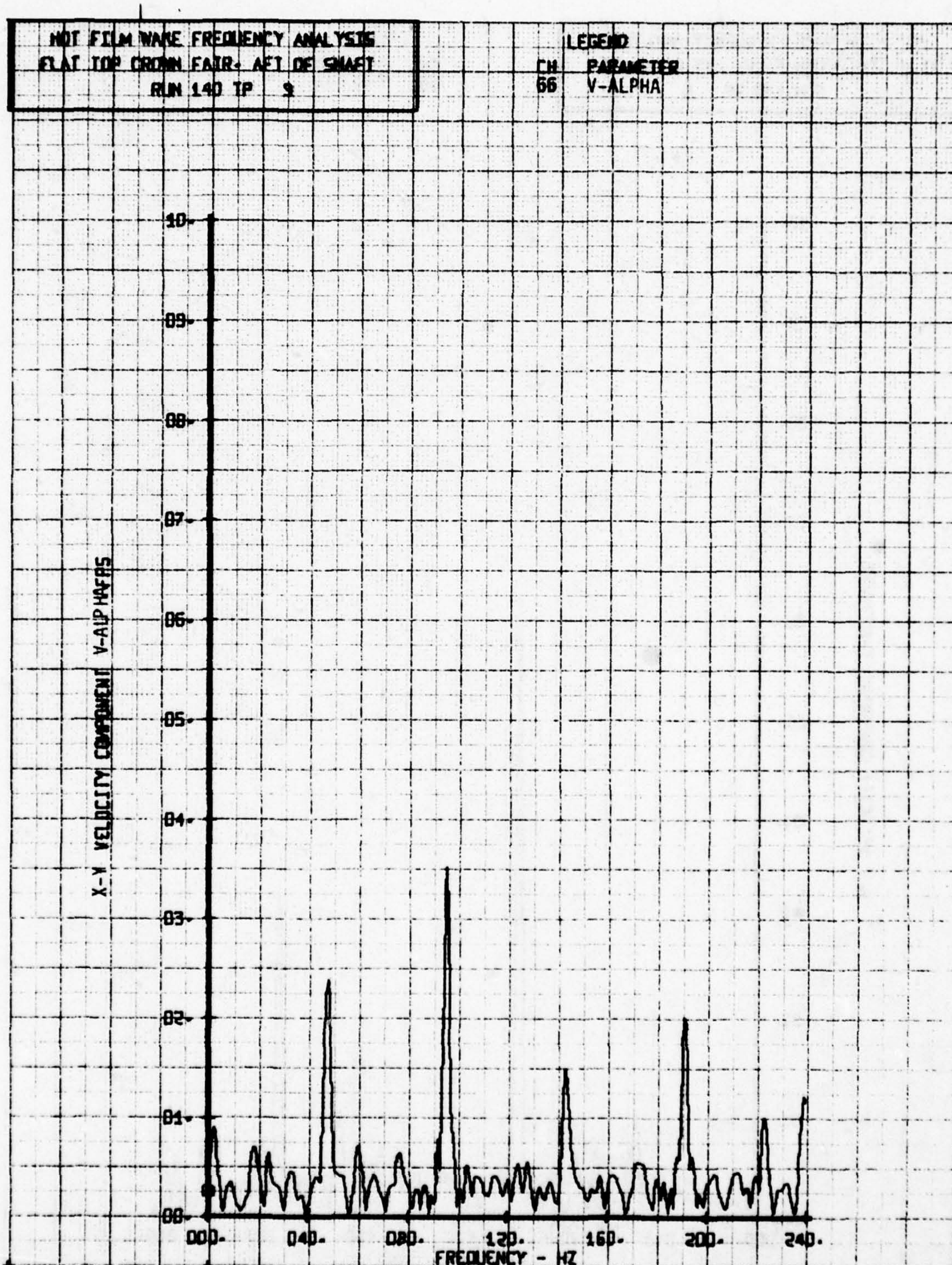
X-Y VELOCITY COMPONENT V-ALPHAFPS
FREQUENCY - HZ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FLAT TOP CROWN FAIR. AFT OF SHAFT
RUN 140 TP 9
LEGEND
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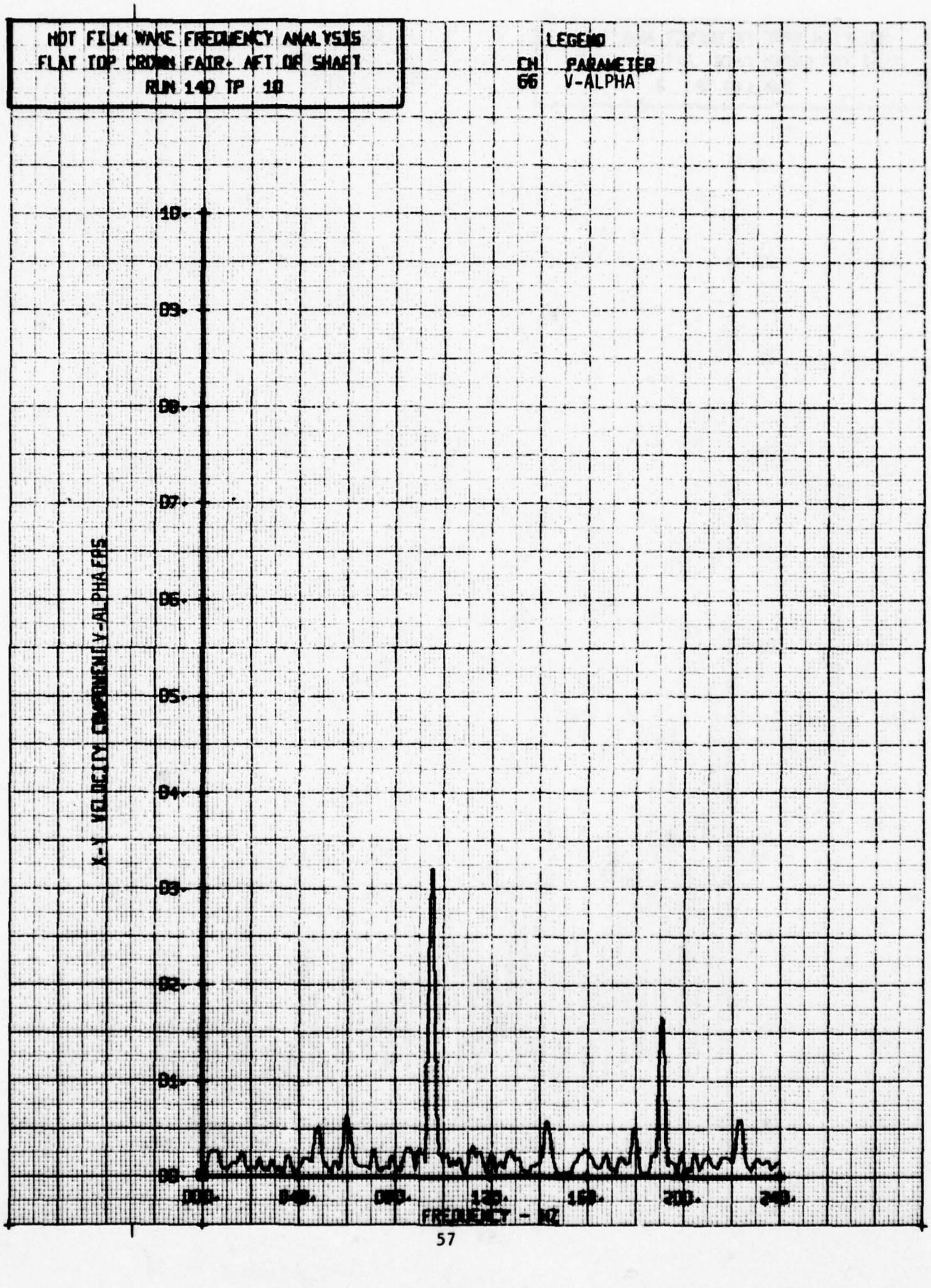
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FLAT TOP CROWN FAIR. AFT OF SHAFT
RUN 140 TP 10
LEGEND
CH PARAMETER
66 V-ALPHA
X-Y VELOCITY COMPONENT V-ALPHA FPS
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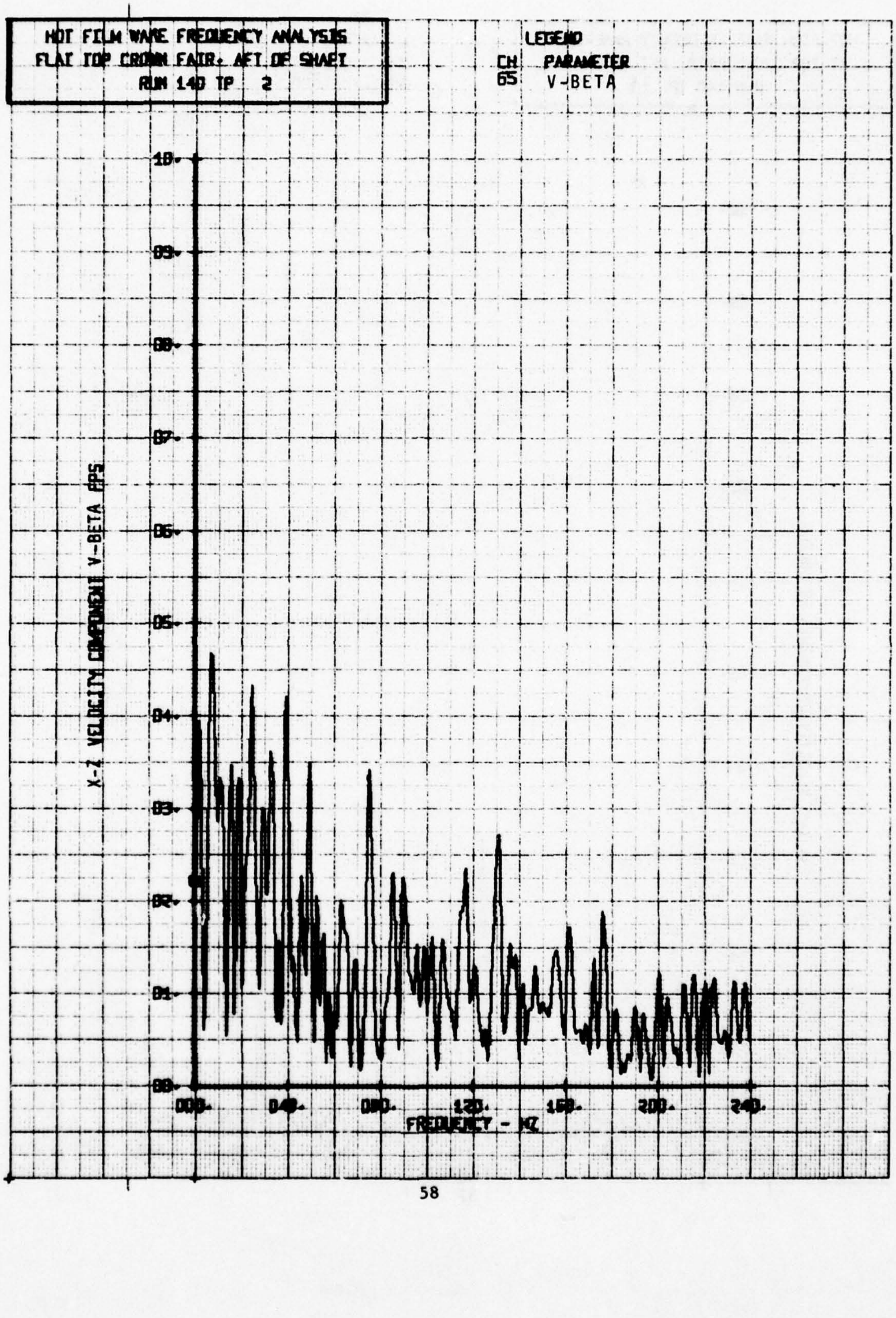
FREQUENCY - HZ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FLAT TOP CROWN FAIR. AFT OF SHAFT
RUN 140 TP 2
LEGEND
CH PARAMETER
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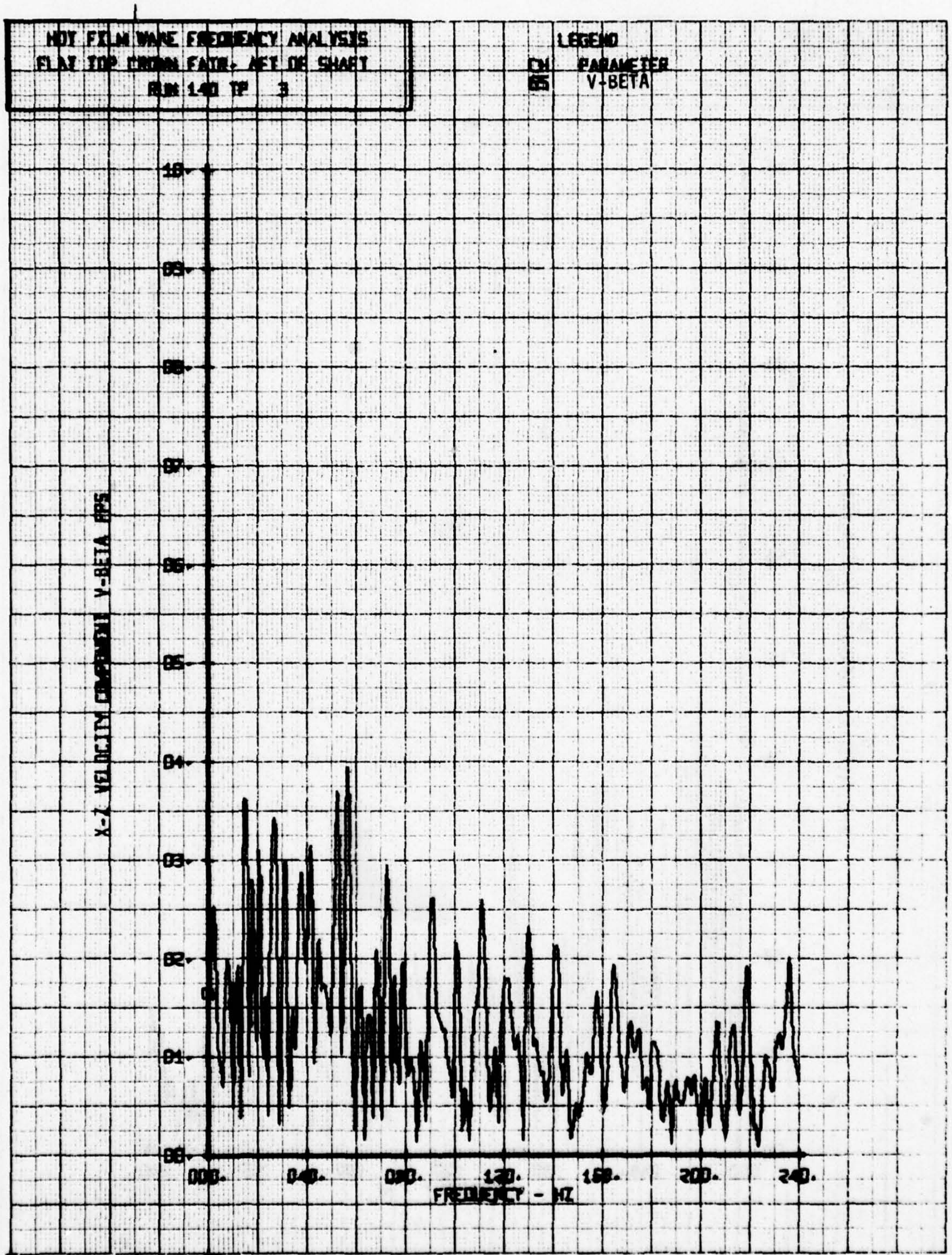
X-Z VELOCITY COMPONENT V-BETA FPS
FREQUENCY - HZ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FLAT TOP CROWN FAIR. AFT OF SHAFT
RUN 140 TP 3
LEGEND
CH PARAMETER
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X-Z VELOCITY COMPONENT V-BETA FPS
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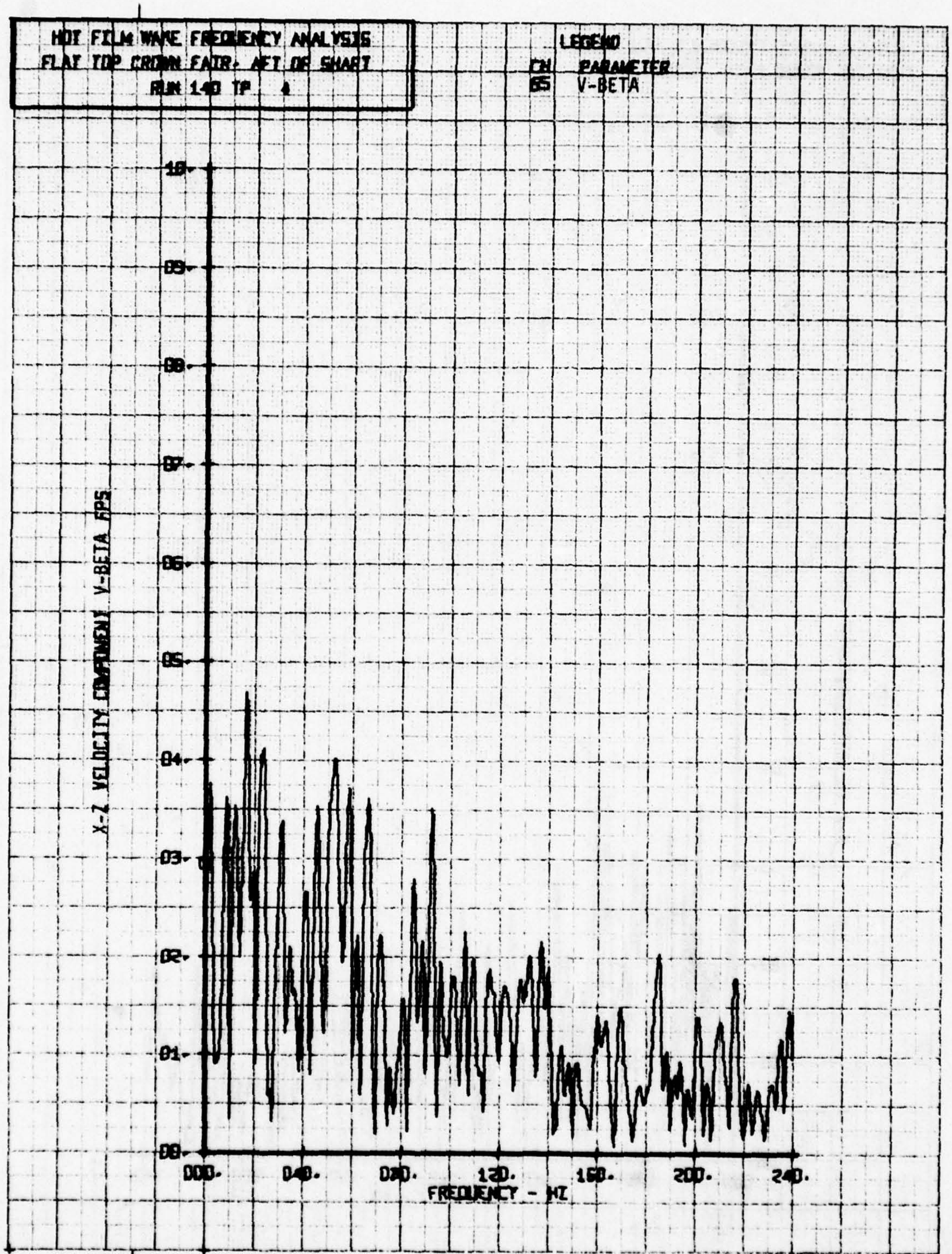
FREQUENCY - HZ


HOT FILM WAKE FREQUENCY ANALYSIS
FLAT TOP CROWN FAIR. AFT OF SHAFT
RUN 140 TP. 4
LEGEND
CH PARAMETER
65 V-BETA
X-Z VELOCITY COMPONENT V-BETA FPS
FREQUENCY - HZ
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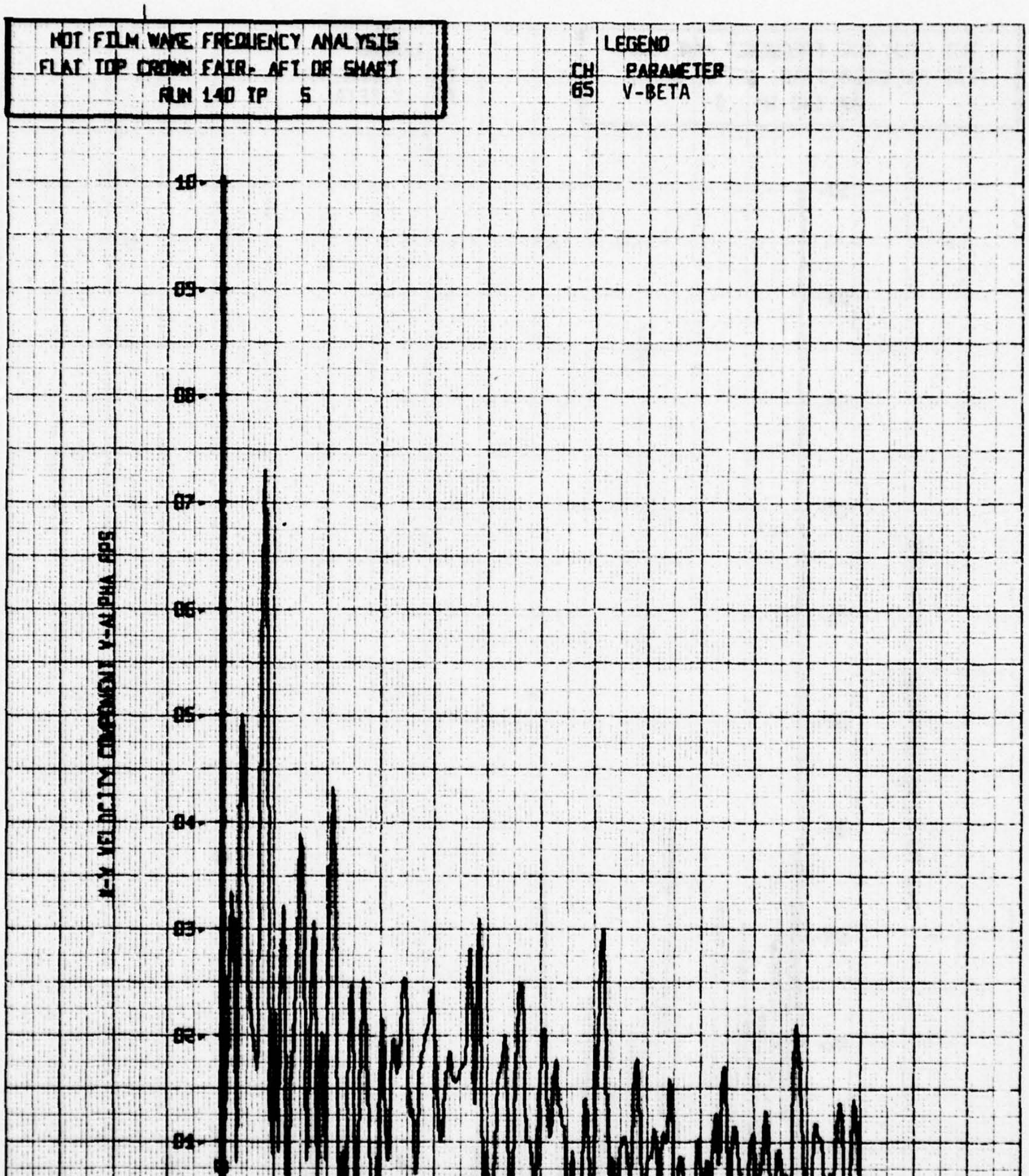
HOT FILM WAKE FREQUENCY ANALYSIS
FLAT TOP CROWN FAIR, AFT OF SHAFT
RUN 140 TP 5
LEGEND
CH PARAMETER
65 V-BETA
VELOCITY COMPONENT V-ALPHA RPS
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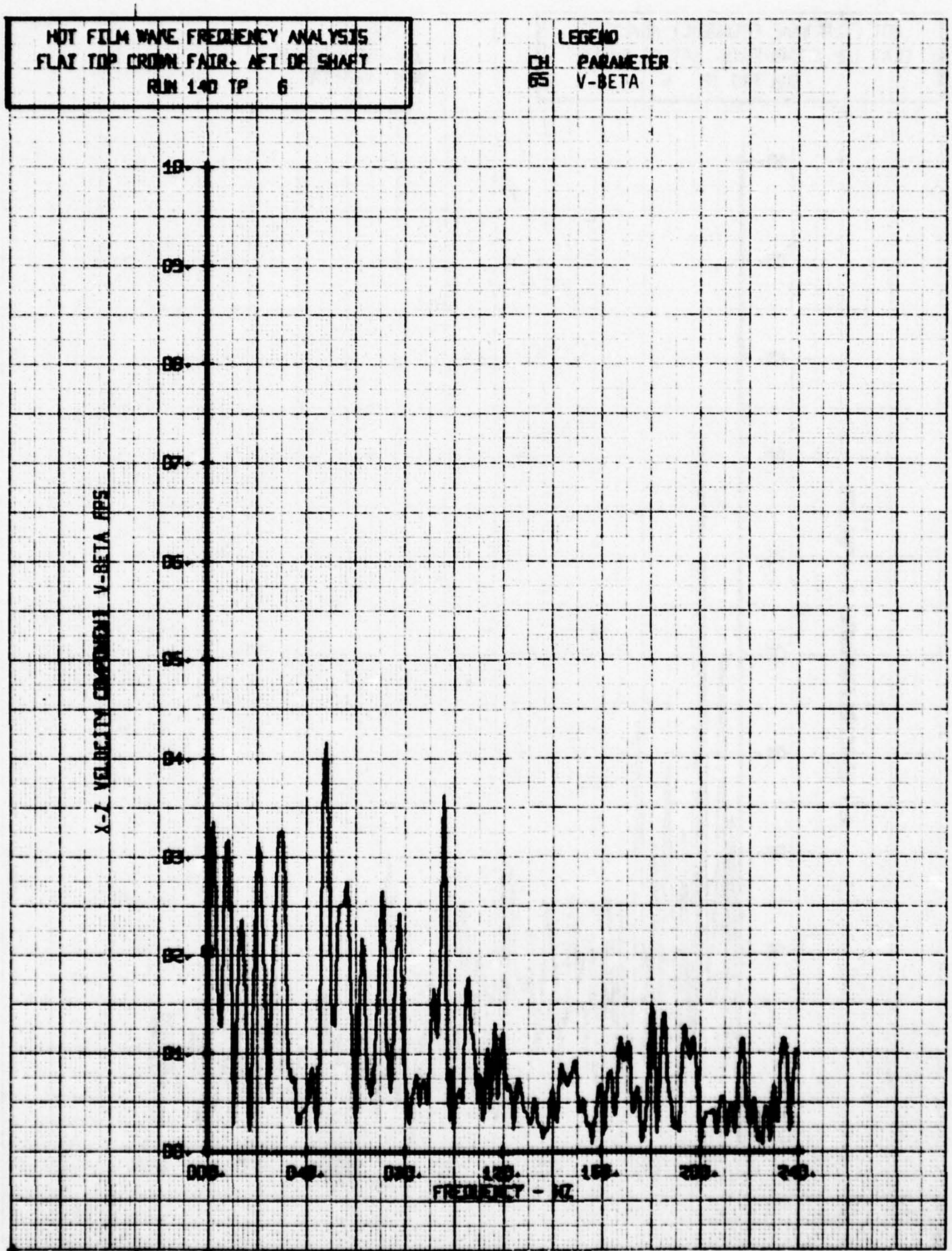
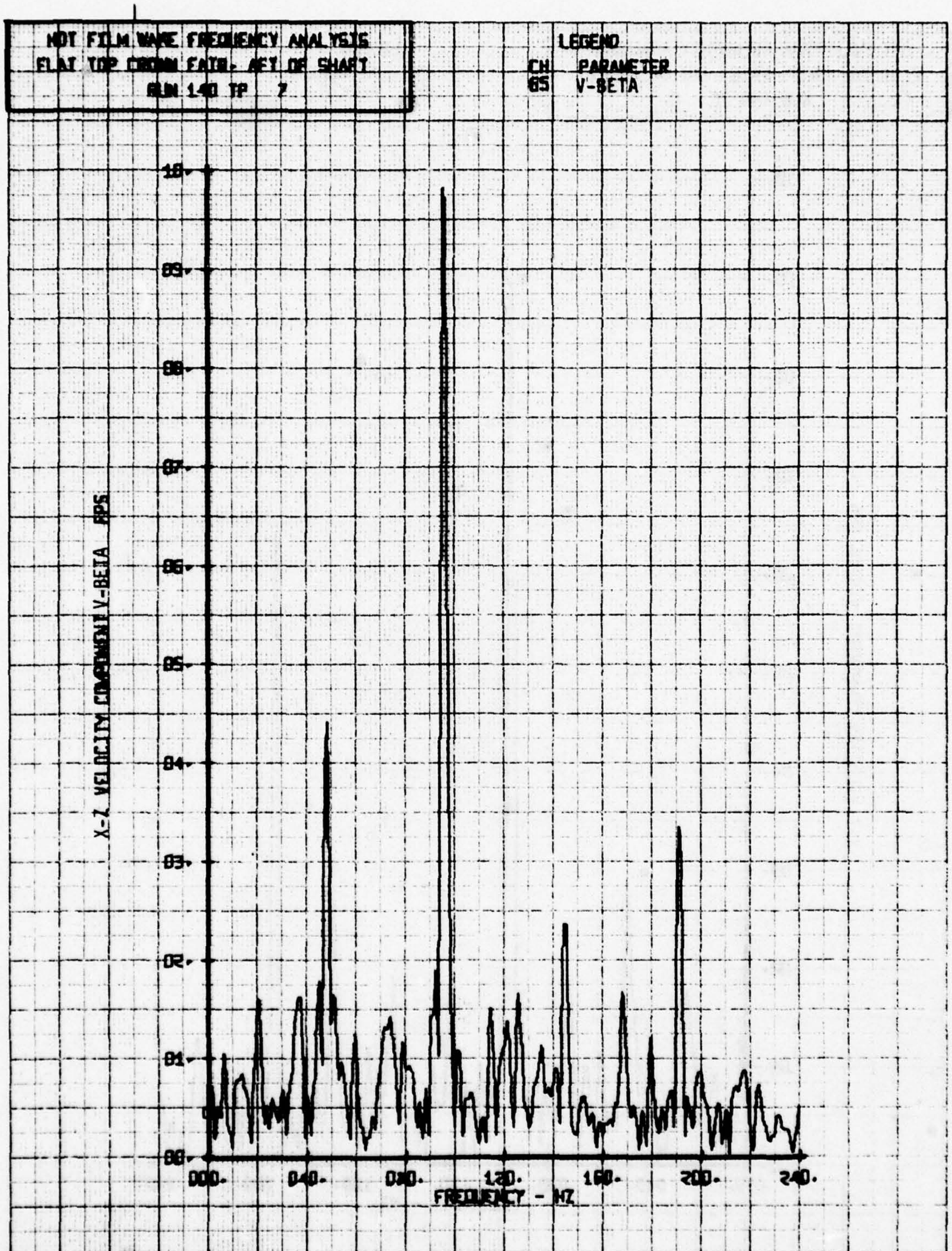
FREQUENCY - HZ


HOT FILM WAKE FREQUENCY ANALYSIS
FLAT TOP CROWN FAIR. AFT OF SHAFT
RUN 140 TP 6
LEGEND
CH PARAMETER
65 V-BETA
X-Z VELOCITY COMPONENT V-BETA RMS
FREQUENCY - HZ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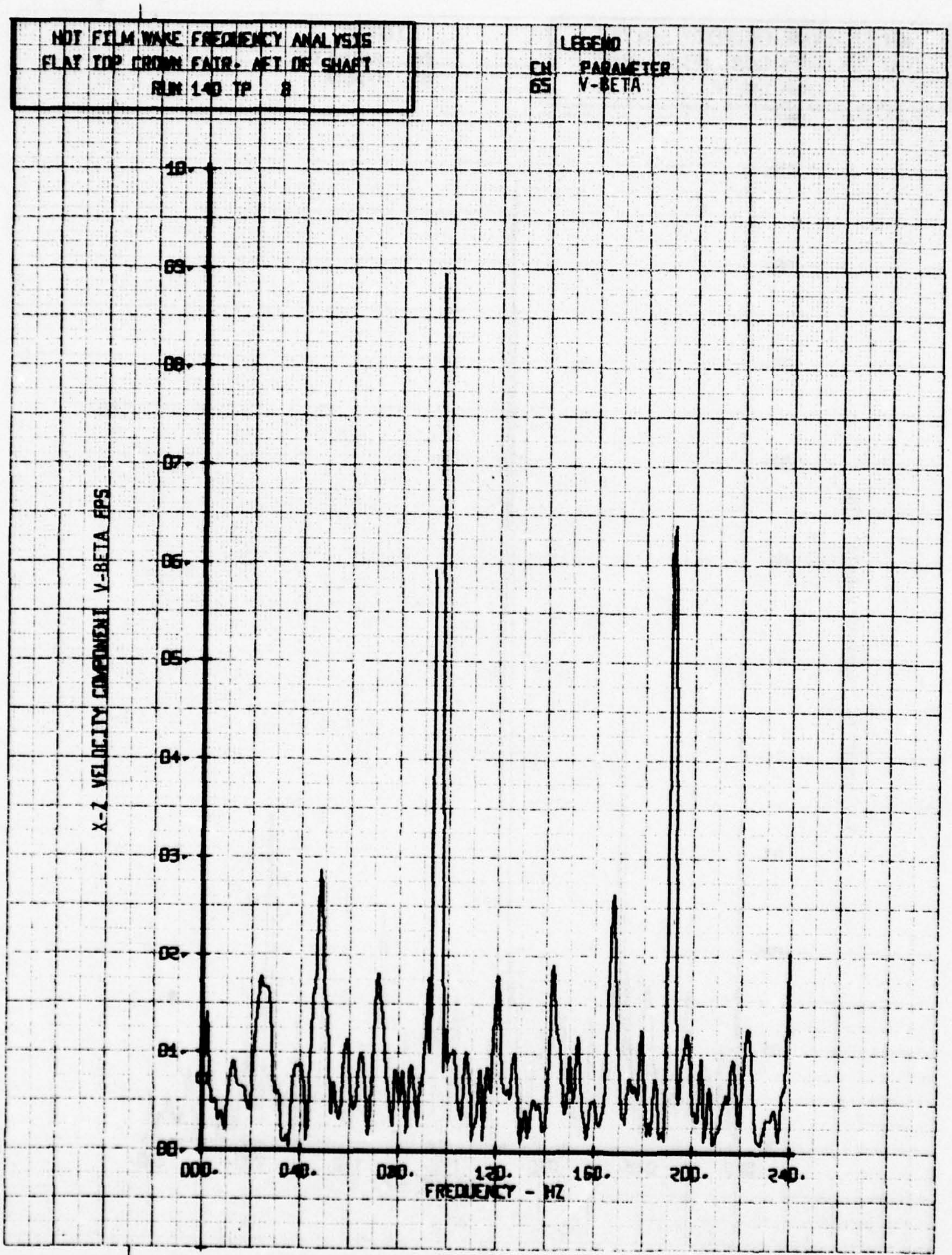
FLAT TOP CROWN FAIR. AFT OF SHAFT
RUN 140 TP 7
LEGEND
CH PARAMETER
65 V-BETA
X-Z VELOCITY COMPONENT V-BETA RPS
FREQUENCY - HZ



HOT FILM WAKE FREQUENCY ANALYSIS
FLAT TOP CROWN FAIR. AFT OF SHAFT
RUN 140 TP 8
LEGEND
CH PARAMETER
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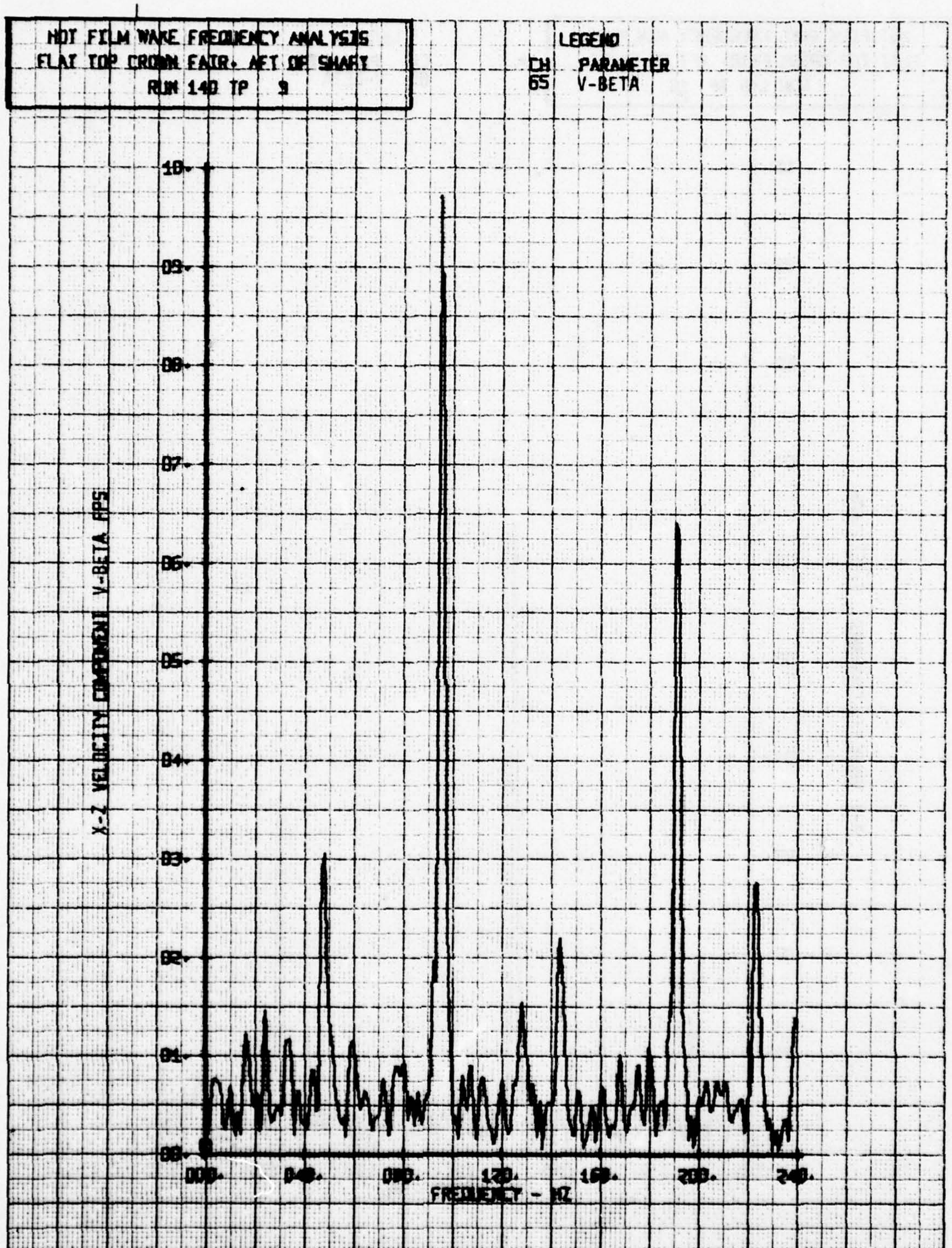
X-Z VELOCITY COMPONENT V-BETA FPS
FREQUENCY - HZ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FLAT TOP CROWN FAIR. AFT OF SHAFT
RUN 140 TP 9
LEGEND
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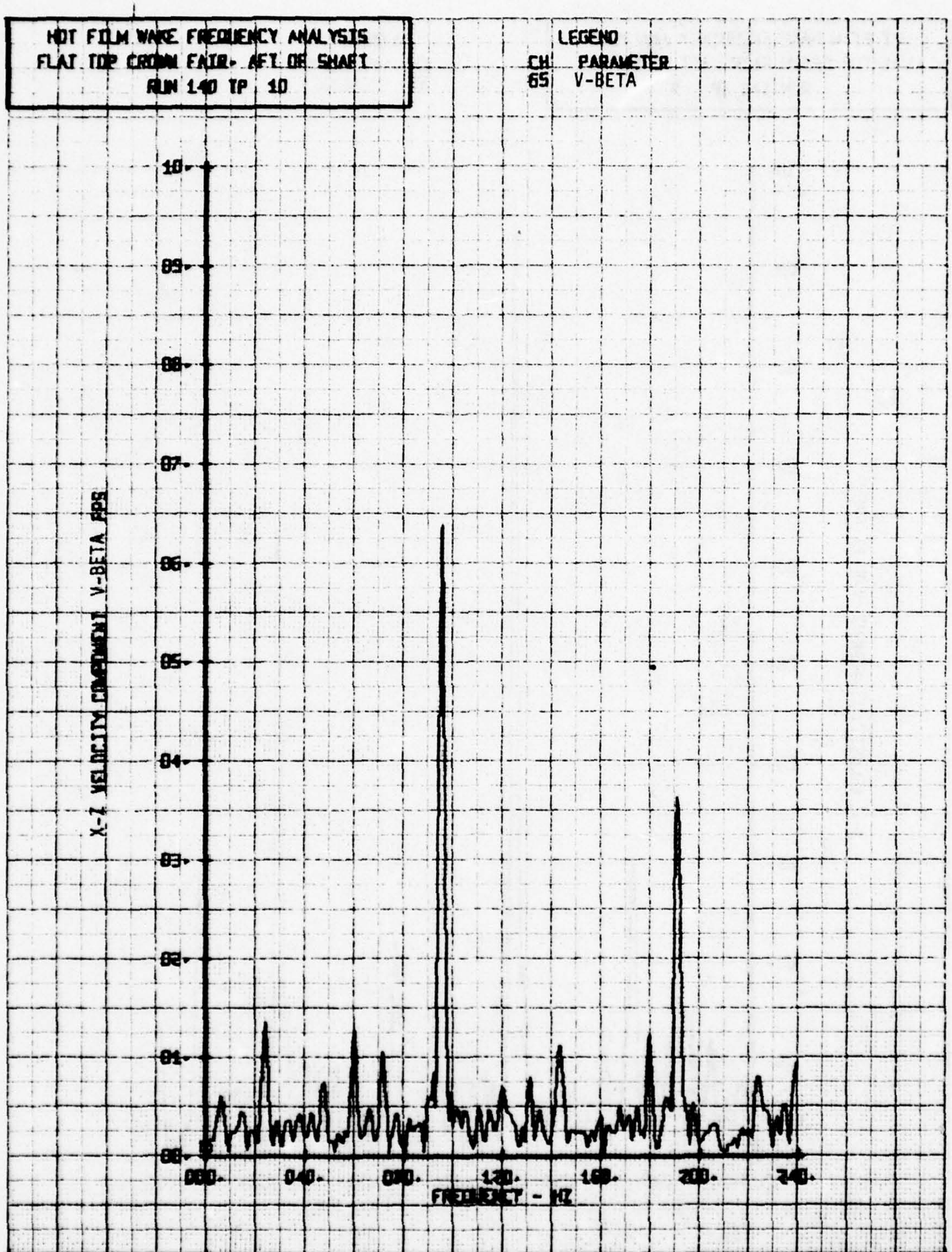
X-Z VELOCITY COMPONENT V-BETA RPS
FREQUENCY - HZ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FLAT TOP CROWN FAIR- AFT OF SHAFT
RUN 140 TP 10
LEGEND
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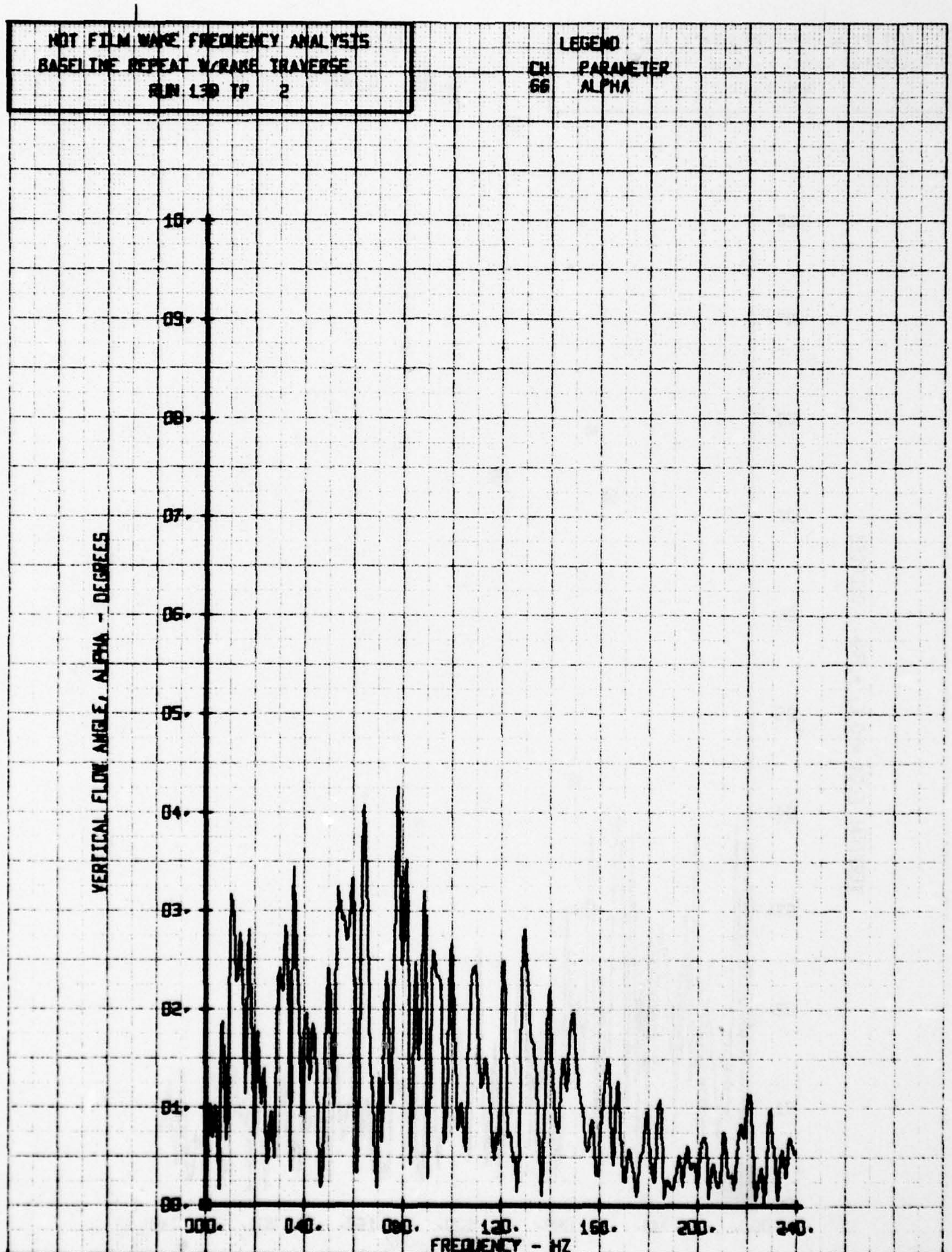
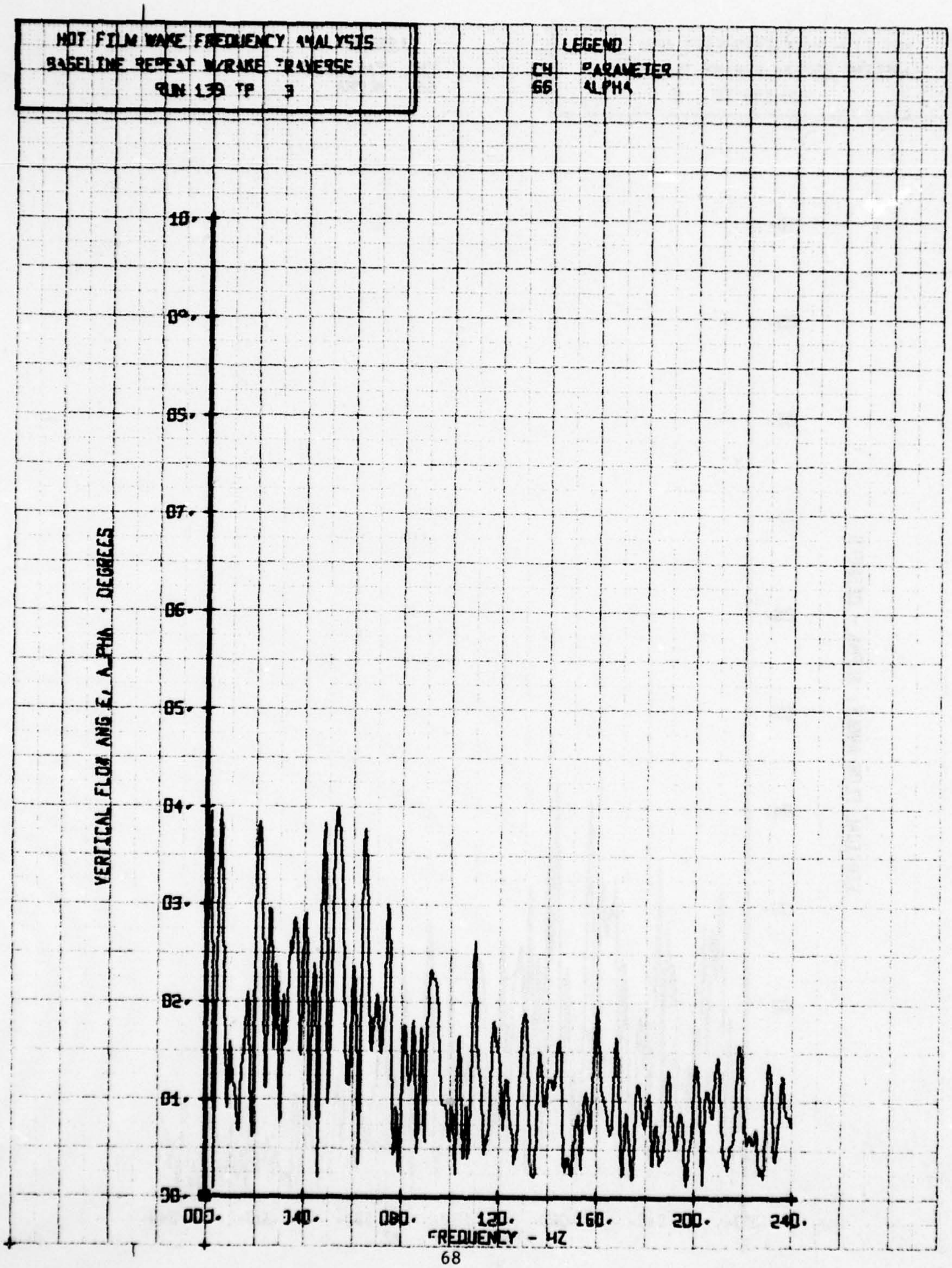
X-Z VELOCITY COMPONENT V-BETA FPS
FREQUENCY - HZ



HOT FILM WAKE FREQUENCY ANALYSIS
BASELINE REPEAT W/RAKE TRAVERSE
RUN 139 TP 2
LEGEND
CH PARAMETER
66 ALPHA
VERTICAL FLOW ANGLE, ALPHA - DEGREES
FREQUENCY - HZ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RUN 139 TP 3
LEGEND
CH PARAMETER
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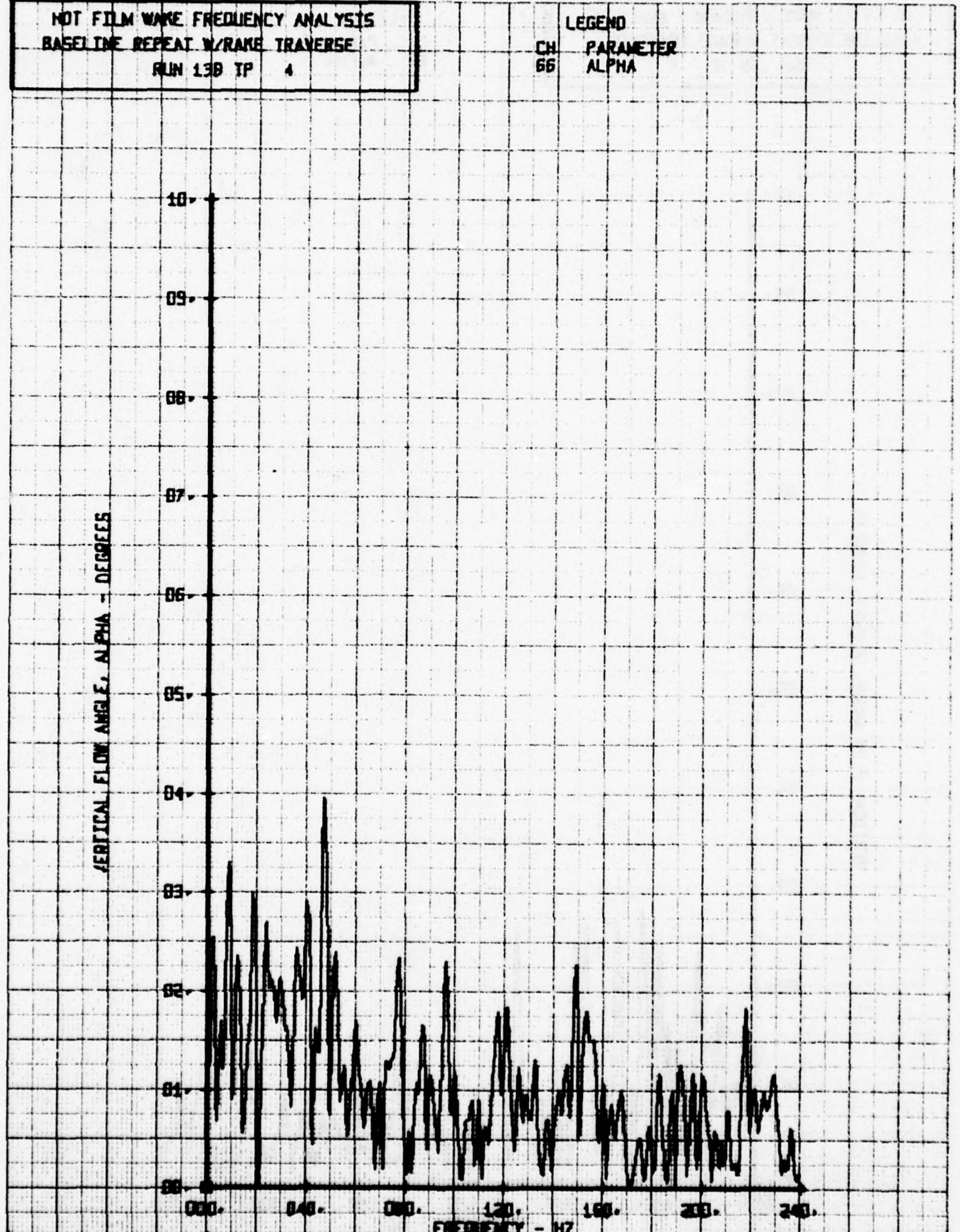
VERTICAL FLOW ANGLE, ALPHA - DEGREES
FREQUENCY - HZ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BASELINE REPEAT W/RAKE TRAVERSE
RUN 138 TP 4
LEGEND
CH PARAMETER
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VERTICAL FLOW ANGLE, ALPHA - DEGREES
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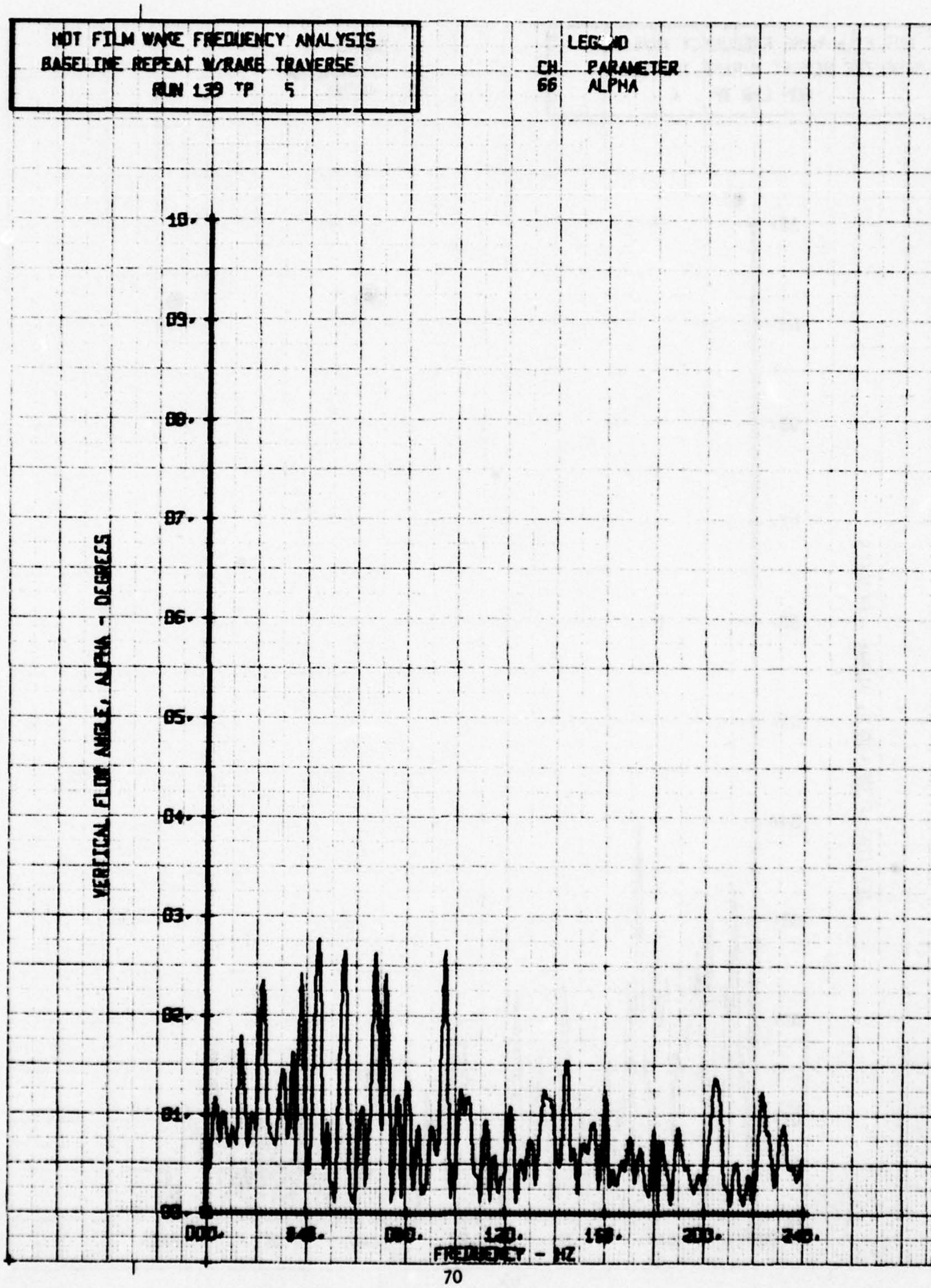
FREQUENCY - HZ



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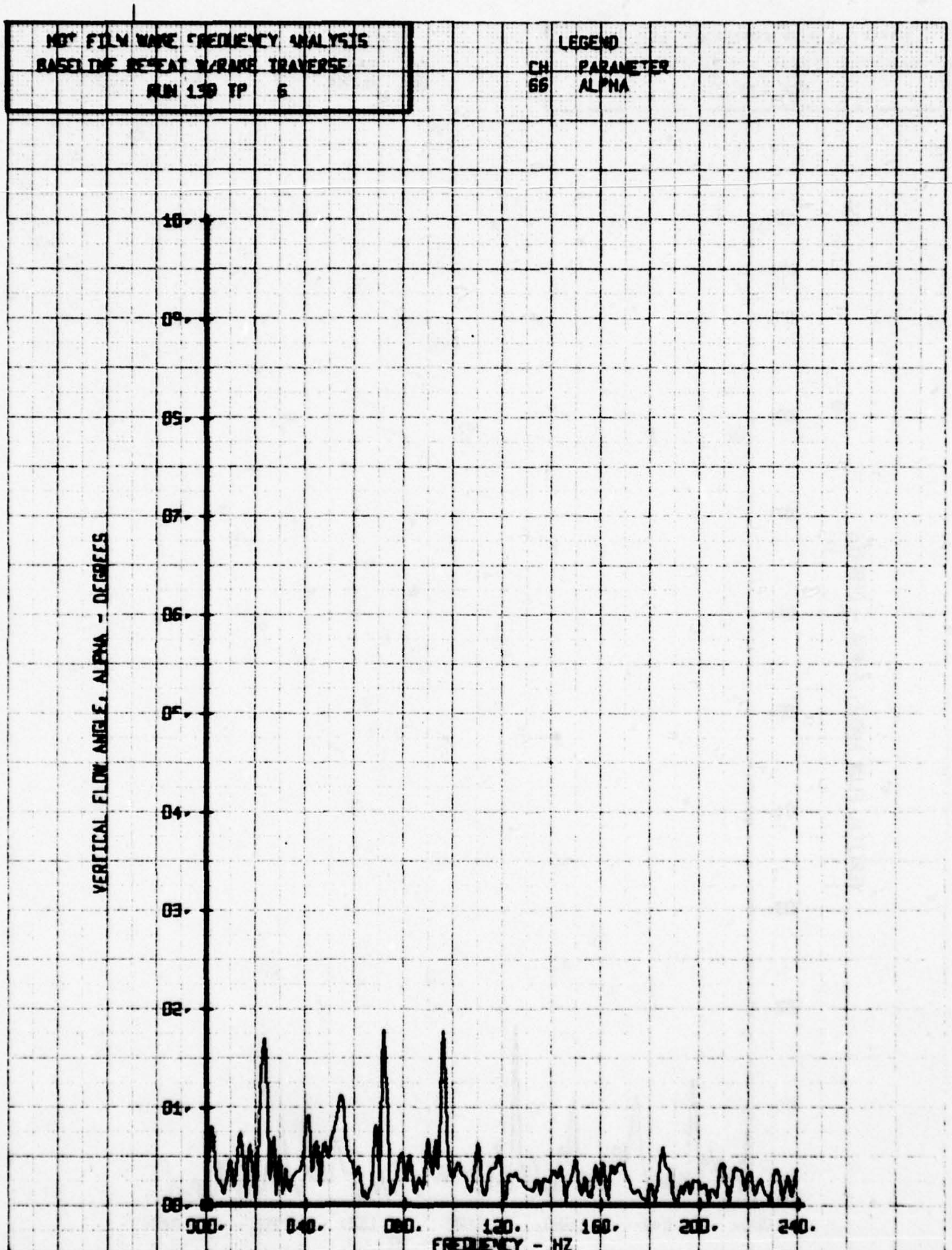
VERTICAL FLOW ANGLE, ALPHA - DEGREES
FREQUENCY - HZ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BASELINE REPEAT W/RAKE TRAVERSE
RUN 139 TP 6
LEGEND
CH PARAMETER
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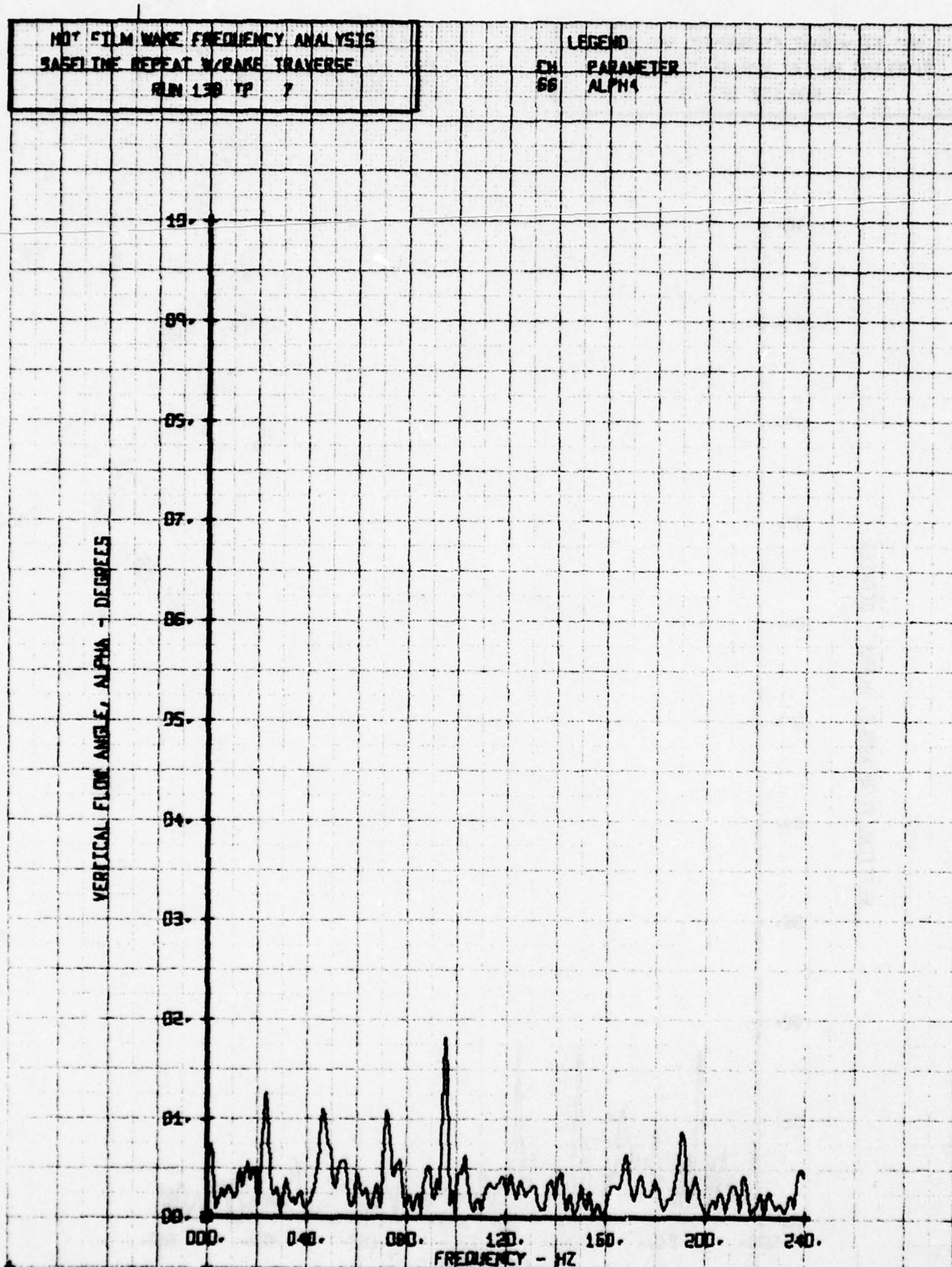
VERTICAL FLOW ANGLE, ALPHA - DEGREES
FREQUENCY - HZ


HOT FILM WAKE FREQUENCY ANALYSIS
BASELINE REPEAT W/RAKE TRAVERSE
RUN 138 TP 7
LEGEND
CH PARAMETER
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VERTICAL FLOW ANGLE, ALPHA - DEGREES
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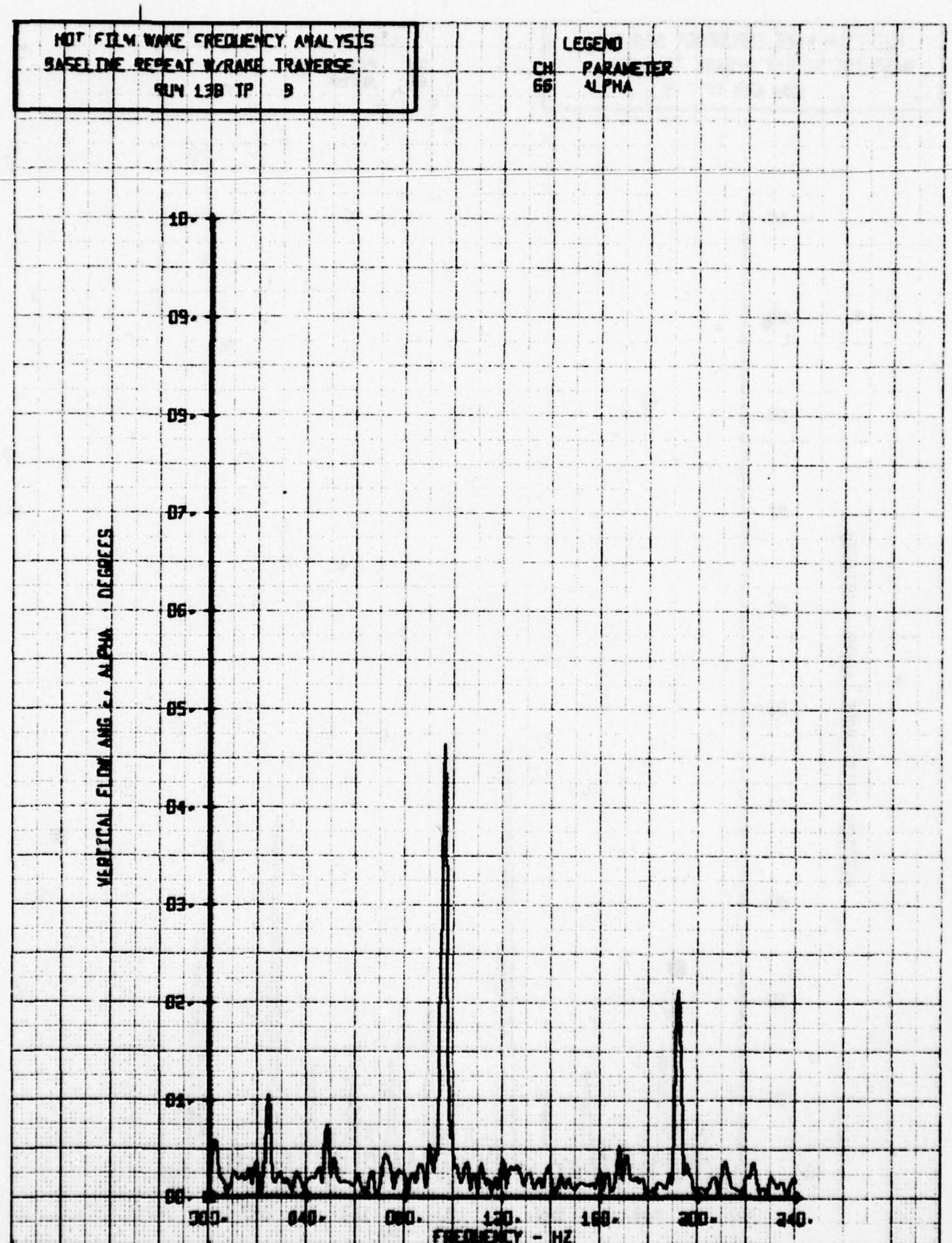
FREQUENCY - HZ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LEGEND
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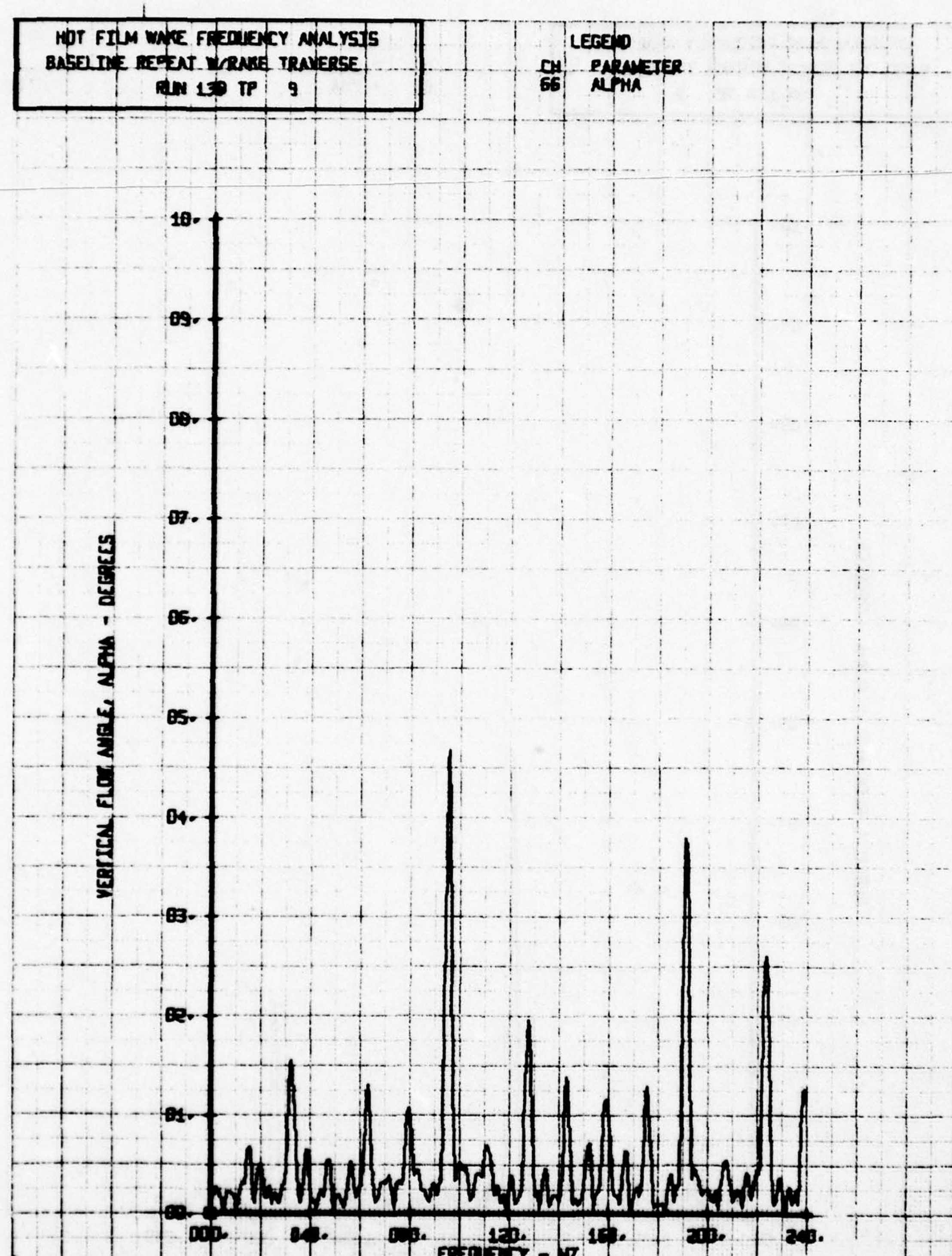
VERTICAL FLOW ANG E, ALPHA DEGREES
FREQUENCY - HZ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BASELINE REPEAT W/RAKE TRAVERSE
RUN 139 TP 9
LEGEND
CH PARAMETER
66 ALPHA
VERTICAL FLOW ANGLE, ALPHA - DEGREES
FREQUENCY - HZ
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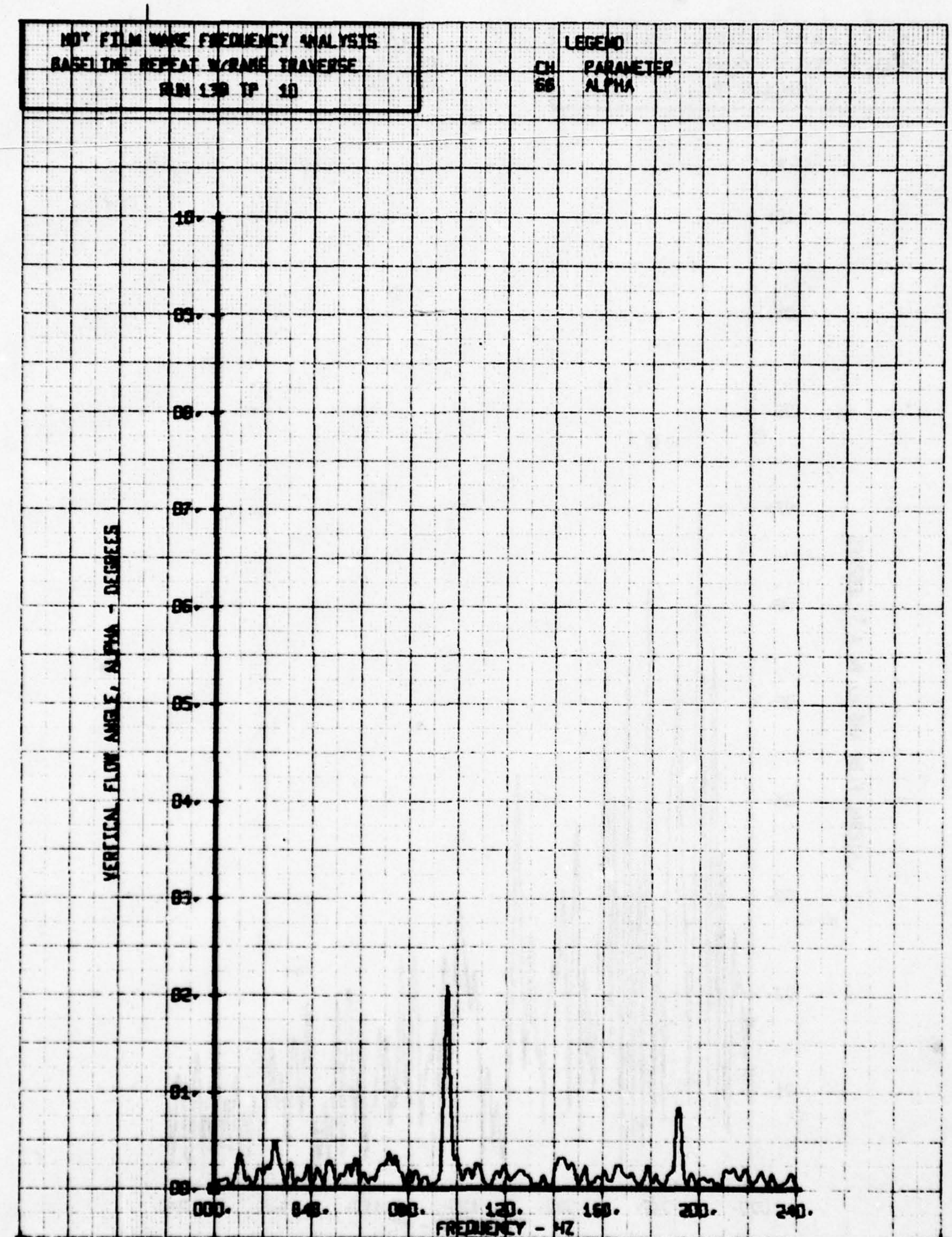
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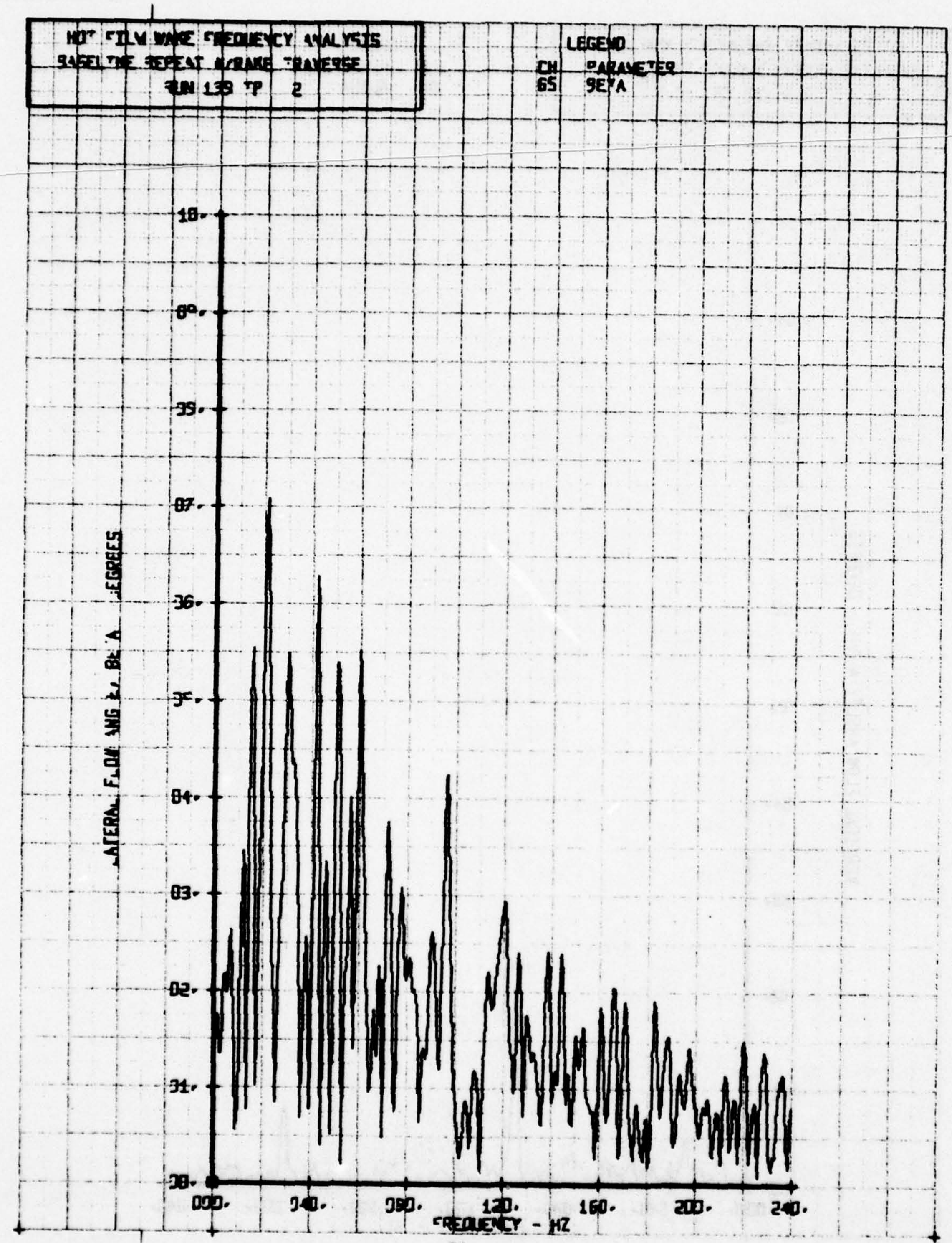
RUN 139 TP 10
LEGEND
CH PARAMETER
68 ALPHA
VERTICAL FLOW ANGLE, ALPHA - DEGREES
FREQUENCY - HZ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BASELINE REPEAT W/RAKE TRAVERSE
RUN 139 TP 2
LEGEND
CH PARAMETER
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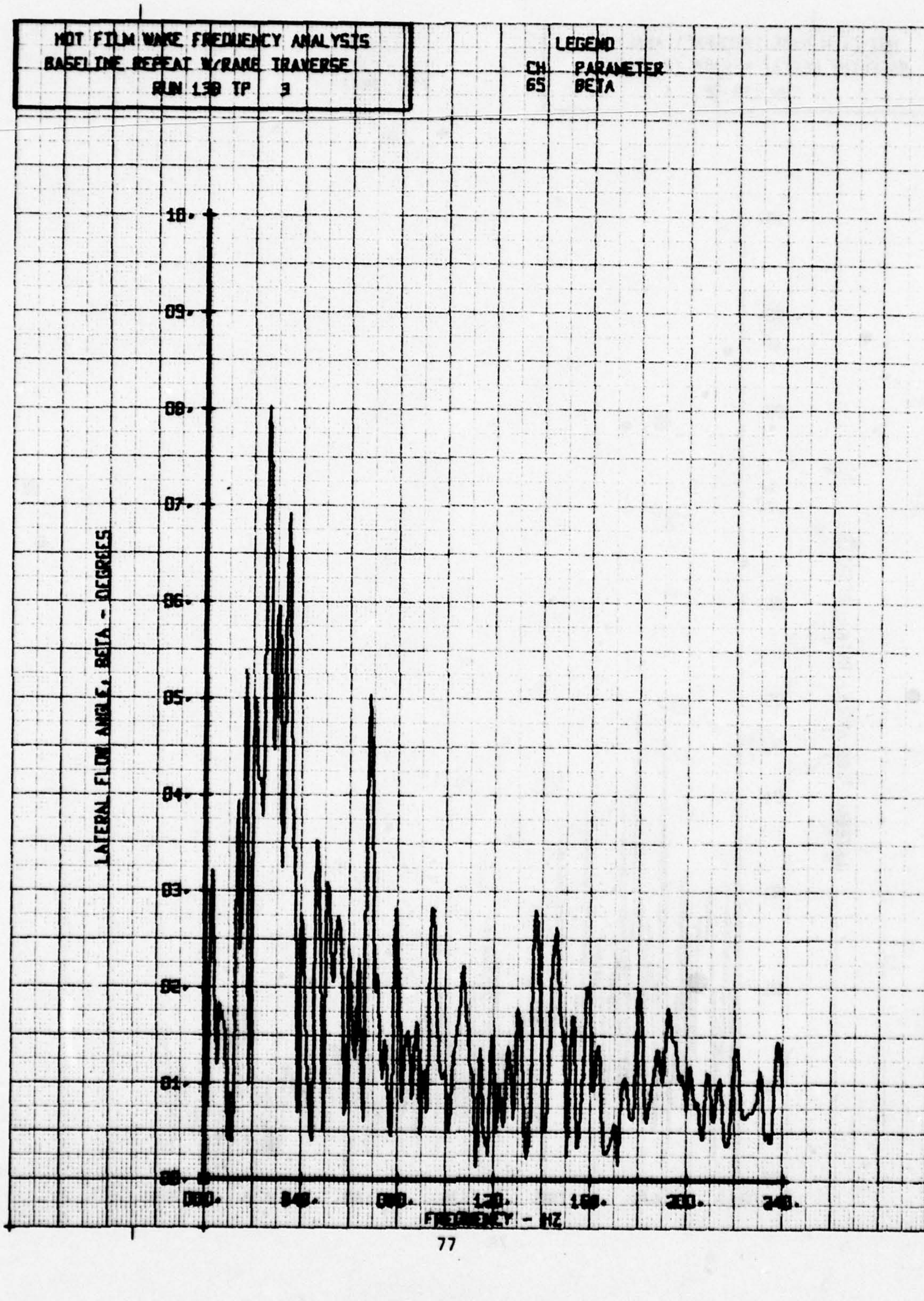
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BASELINE REPEAT W/RAKE TRAVERSE
RUN 138 TP 3
LEGEND
CH PARAMETER
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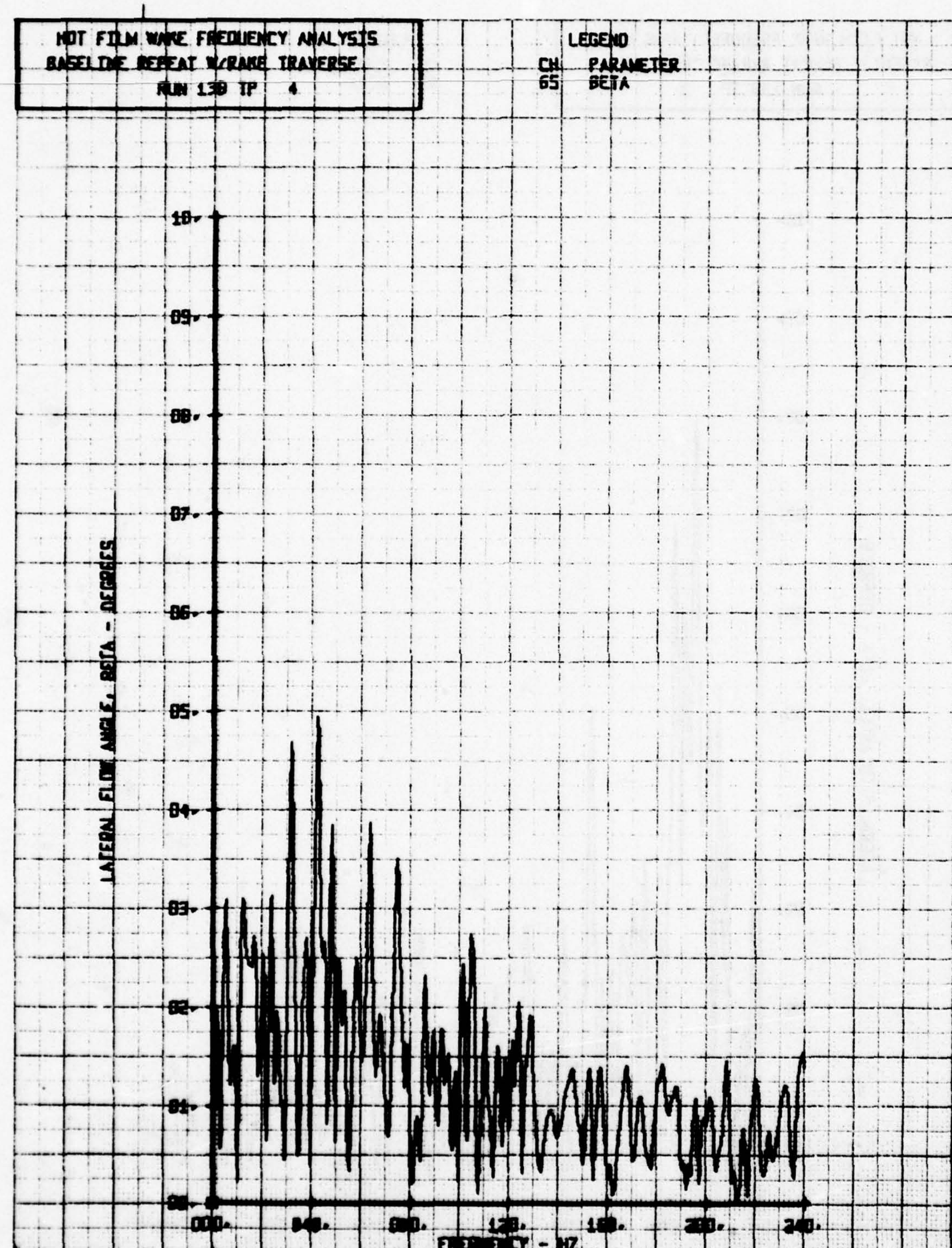
LATERAL FLOW ANGLE, BETA - DEGREES
FREQUENCY - HZ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BASELINE REPEAT W/RAKE TRAVERSE
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LEGEND
CH PARAMETER
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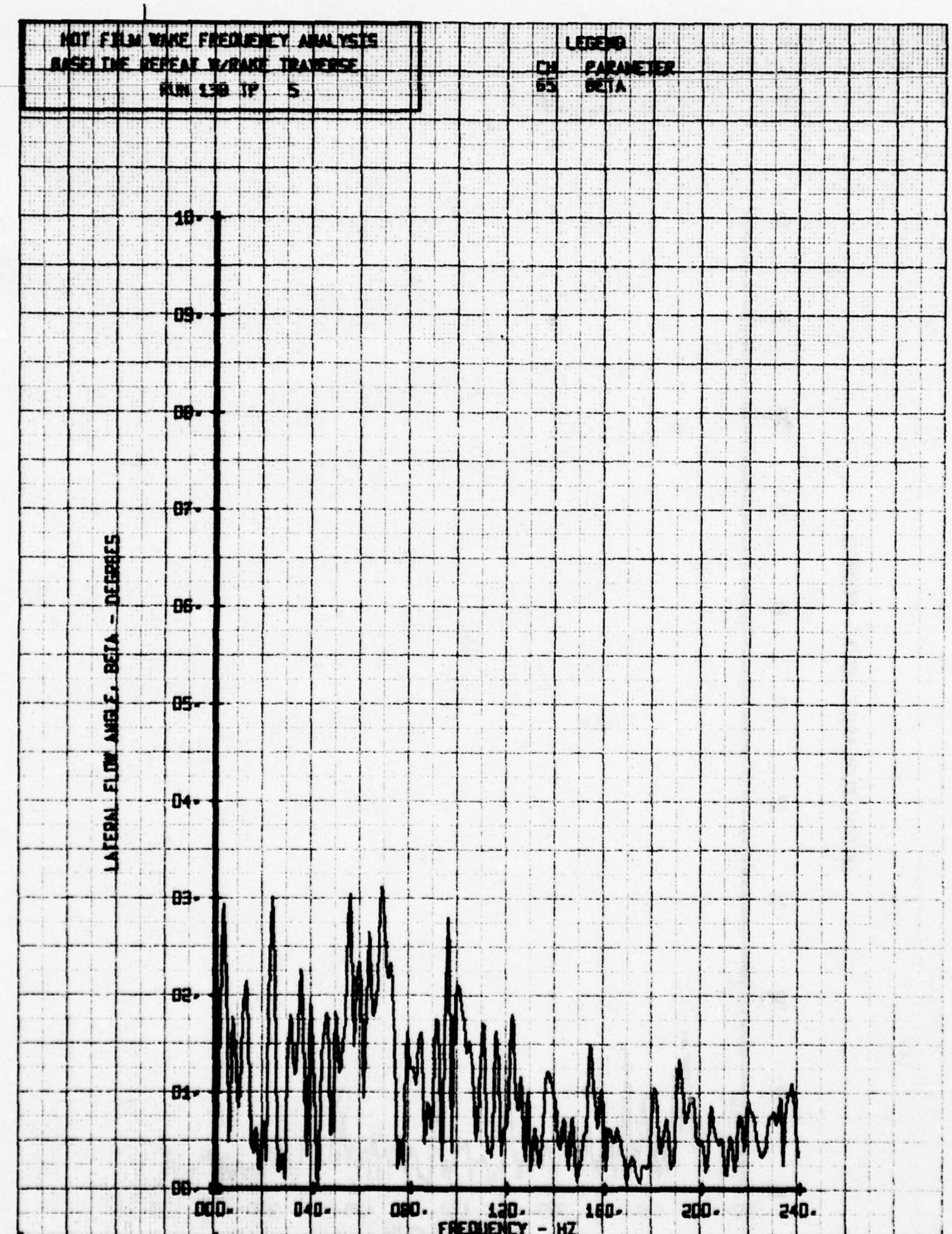
LATERAL FLOW ANGLE, BETA - DEGREES
FREQUENCY - HZ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BASELINE REPEAT W/RAKE TRAVERSE
RUN 138 TP 5
LEGEND
CH PARAMETER
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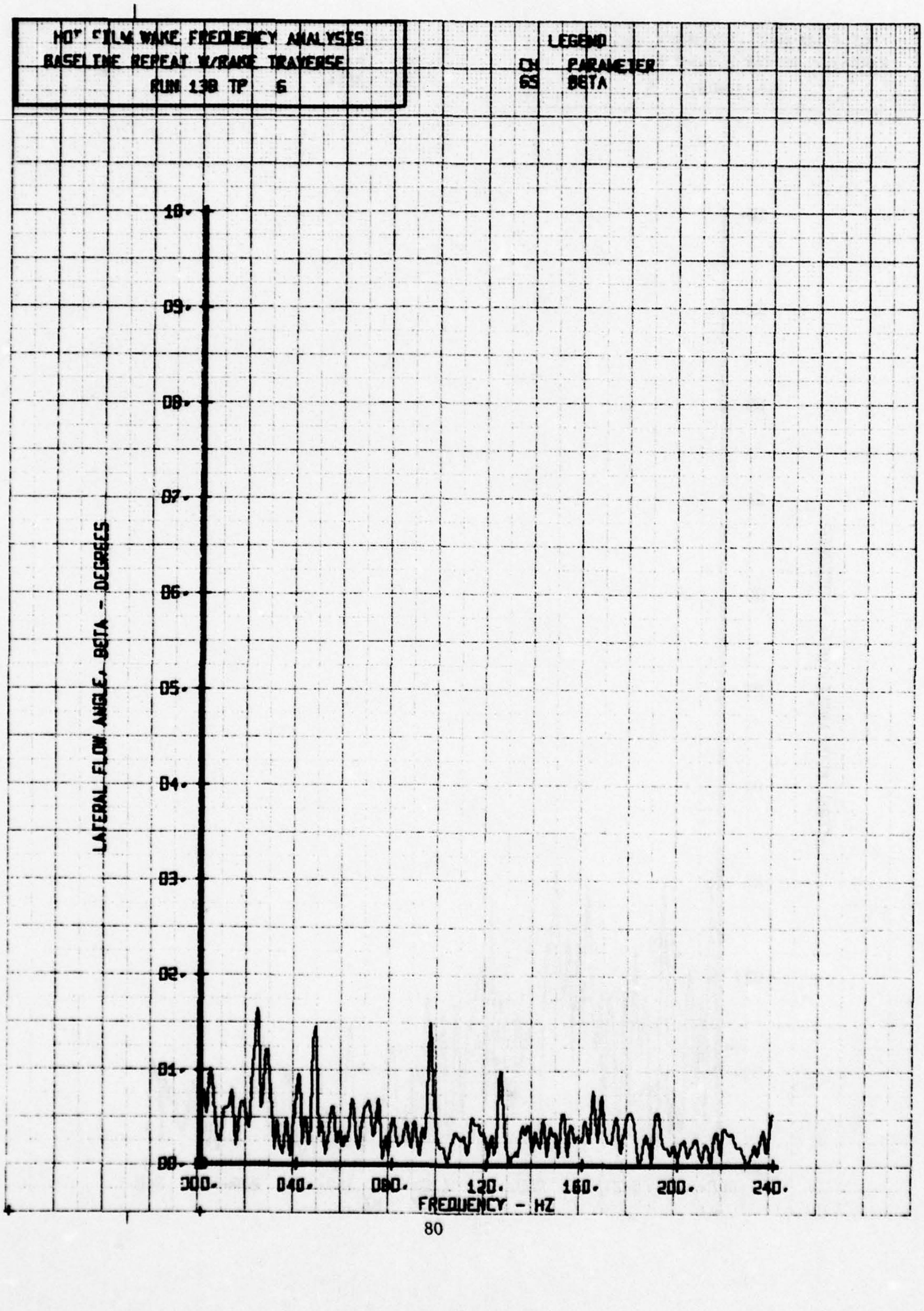
LATERAL FLOW ANGLE, BETA - DEGREES
FREQUENCY - HZ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BASELINE REPEAT W/RAKE TRAVERSE
RUN 138 TP 6
LEGEND
CH PARAMETER
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LATERAL FLOW ANGLE, BETA - DEGREES
FREQUENCY - HZ
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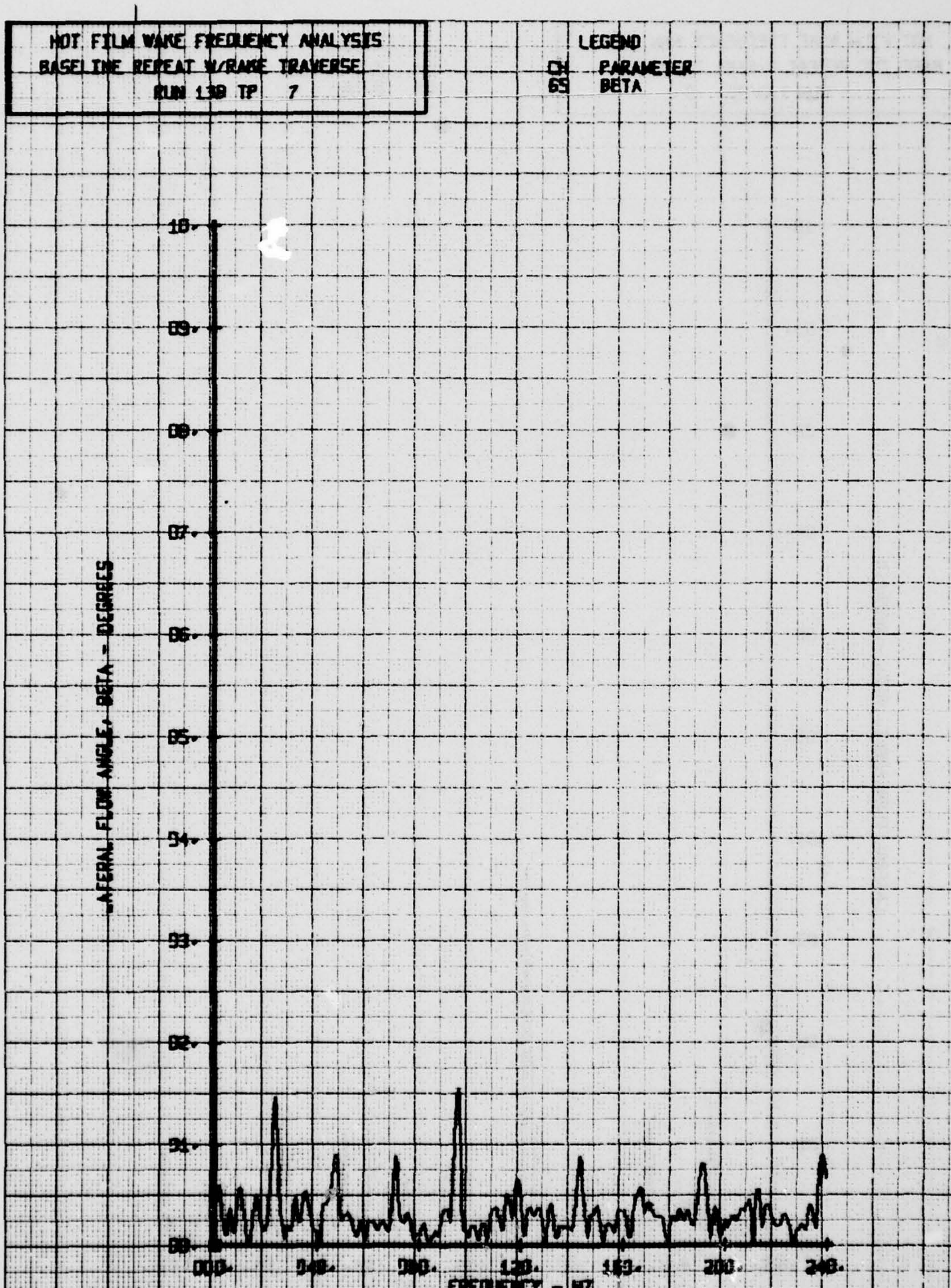
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BASELINE REPEAT W/RAKE TRAVERSE
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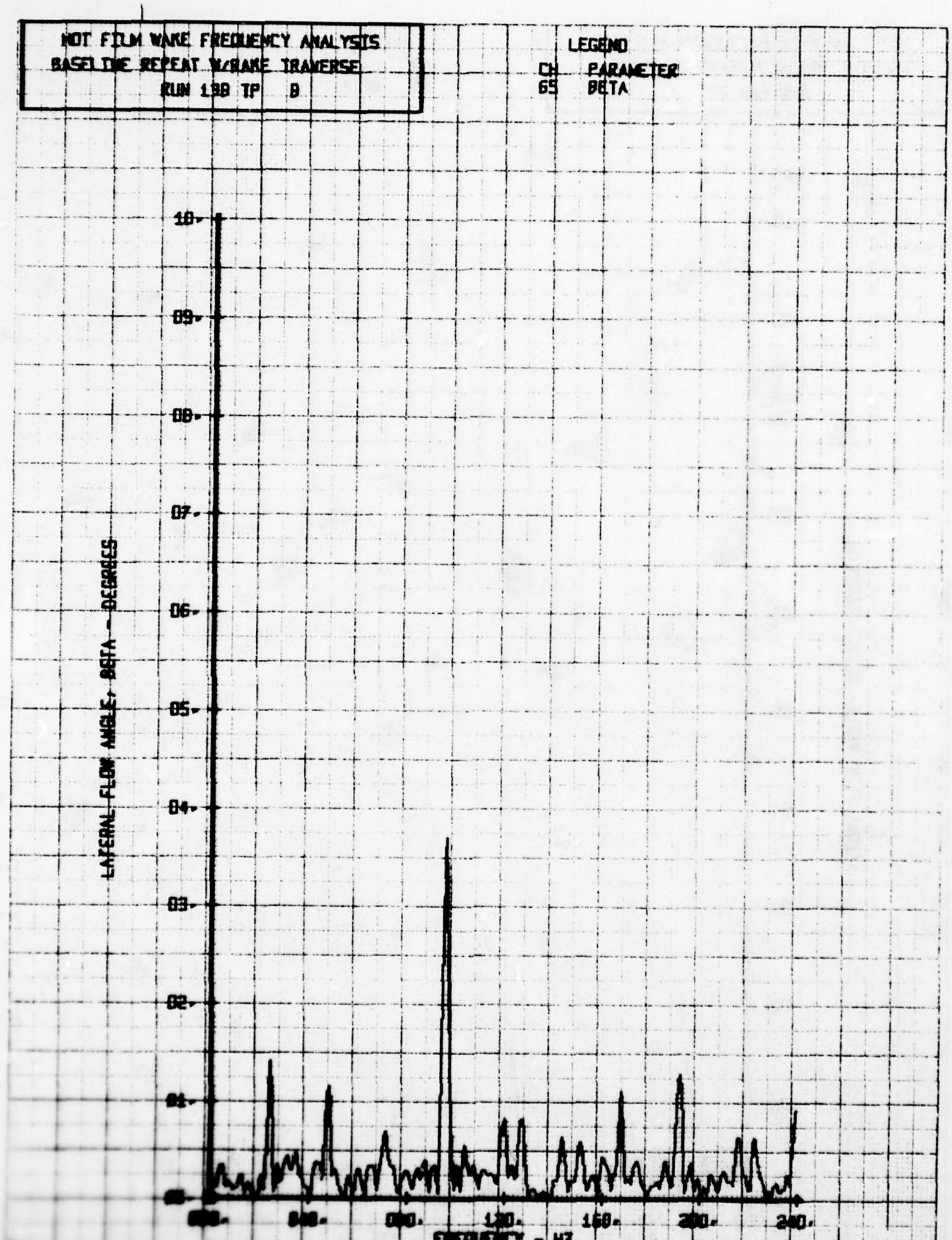
LEGEND
CH PARAMETER
65 BETA
LATERAL FLOW ANGLE, BETA - DEGREES
FREQUENCY - HZ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BASELINE REPEAT W/RAKE TRAVERSE
RUN 138 TP 8
LEGEND
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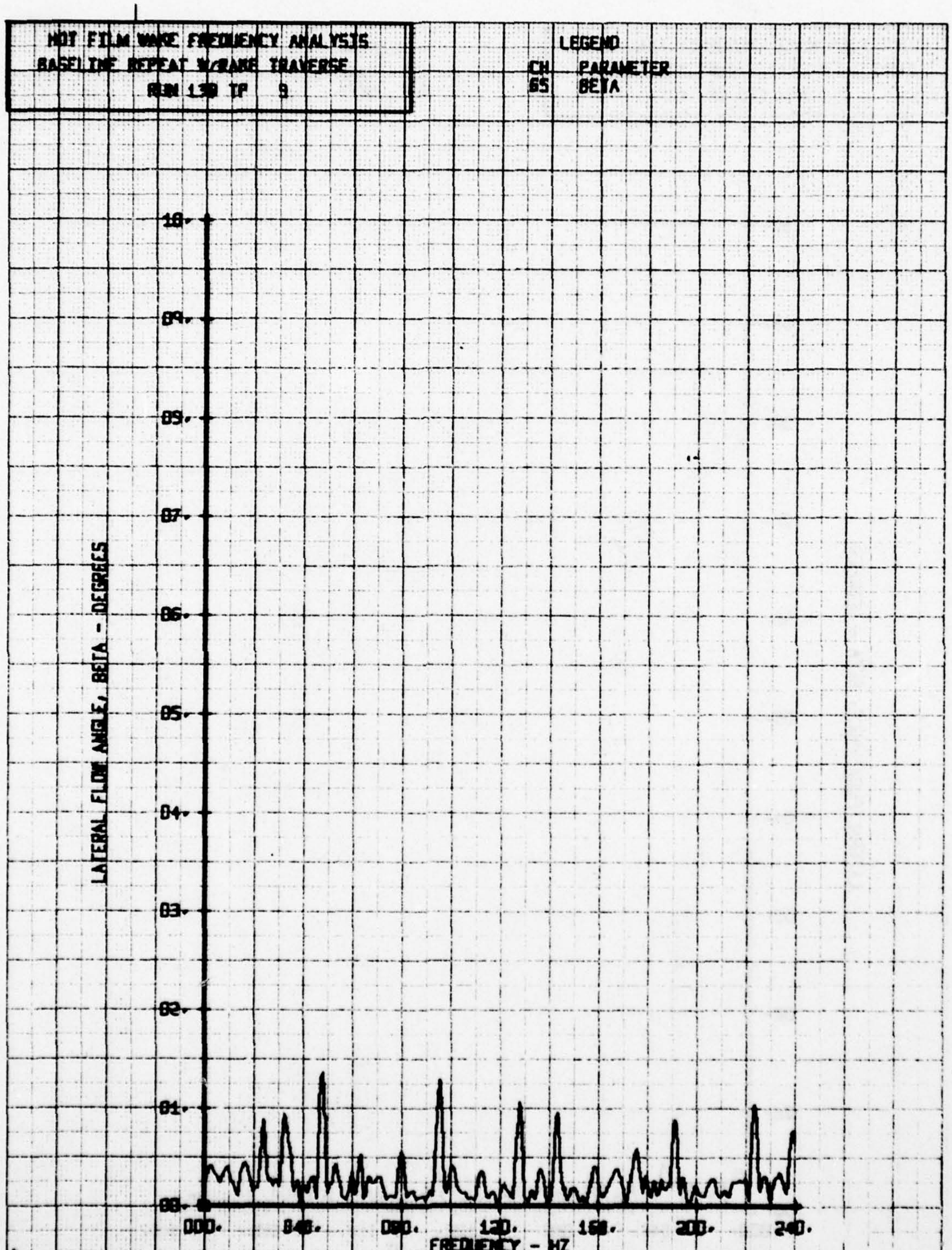
LATERAL FLOW ANGLE, BETA - DEGREES
FREQUENCY - HZ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BASELINE REPEAT W/RAKE TRAVERSE
RUN 139 TP 9
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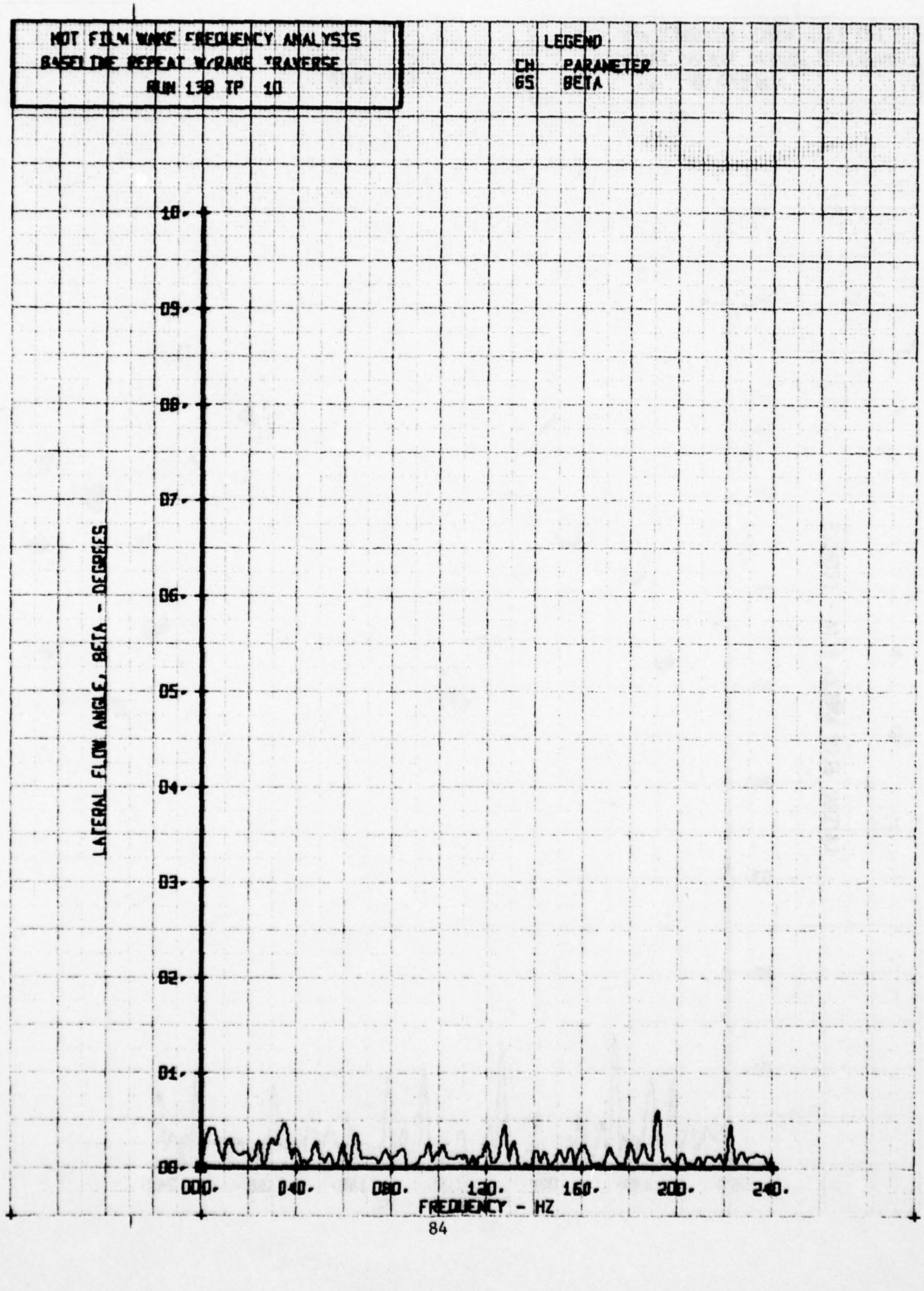
65 BETA
LATERAL FLOW ANGLE, BETA - DEGREES
FREQUENCY - HZ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BASELINE REPEAT W/RAKE TRAVERSE
RUN 138 TP 10
LEGEND
CH PARAMETER
65 BETA
LATERAL FLOW ANGLE, BETA - DEGREES
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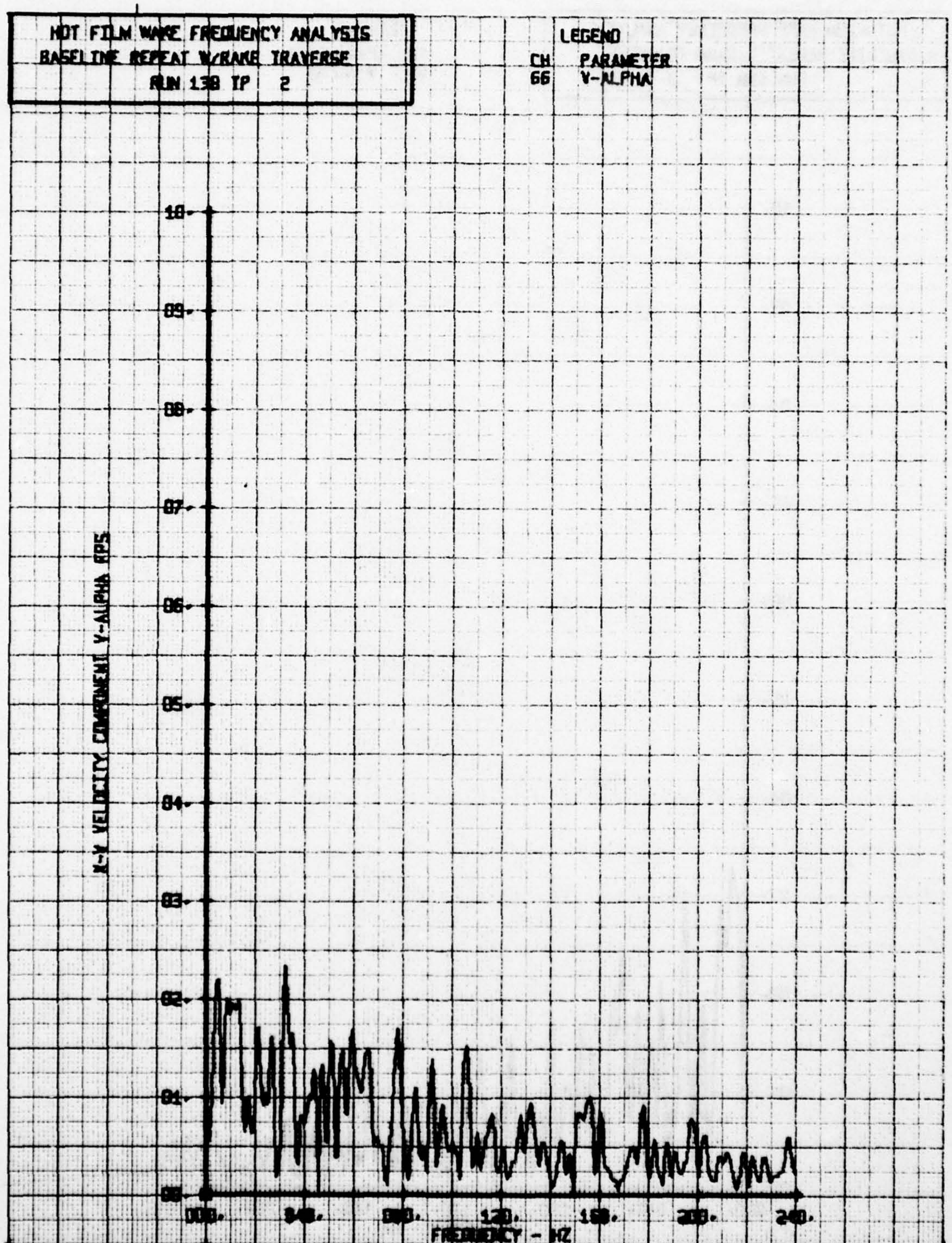
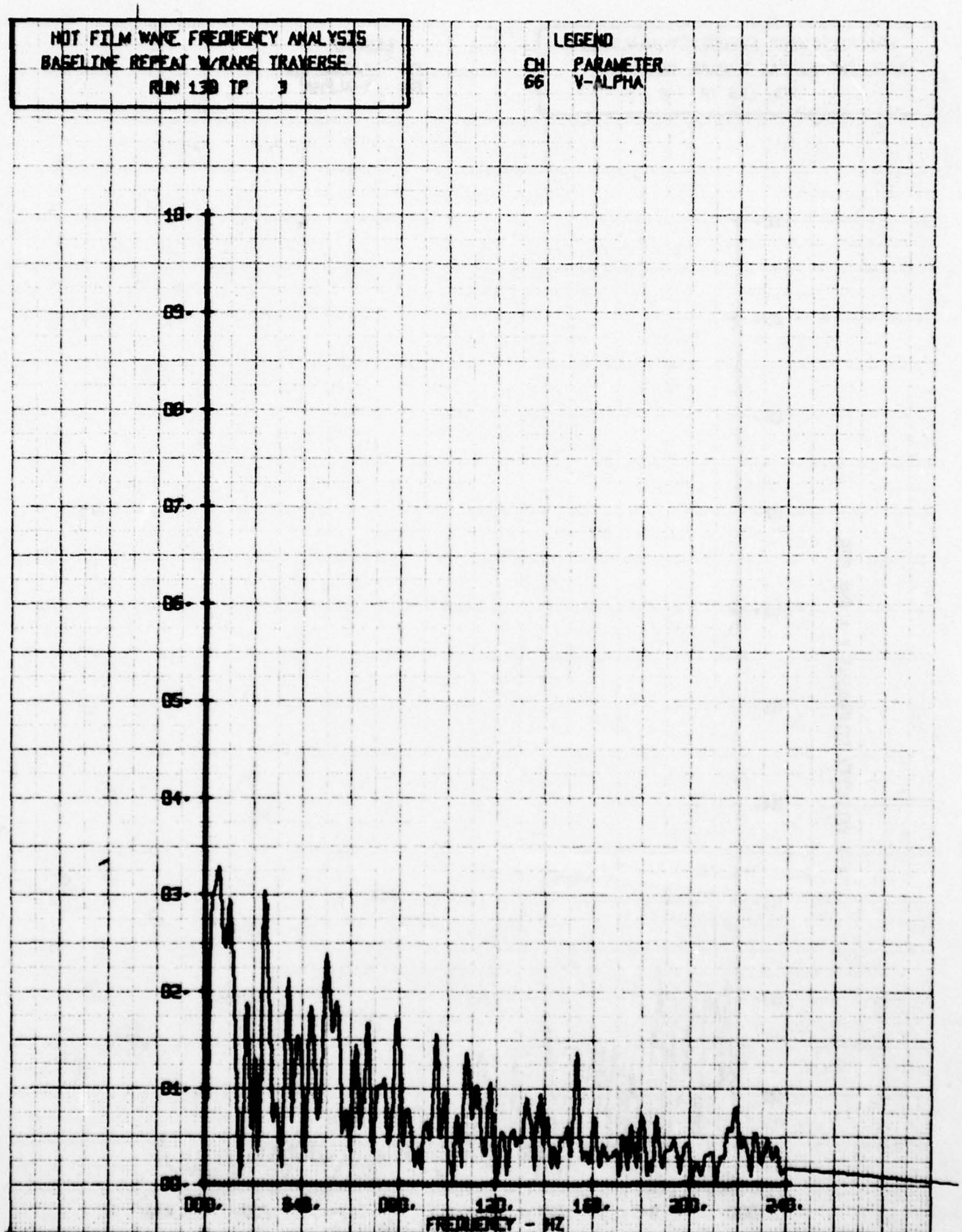
FREQUENCY - HZ


HOT FILM WAKE FREQUENCY ANALYSIS
BASELINE REPEAT W/RAKE TRAVERSE
RUN 138 TP 2
LEGEND
CH PARAMETER
66 V-ALPHA
X-Y VELOCITY COMPONENT V-ALPHA RPS
FREQUENCY - HZ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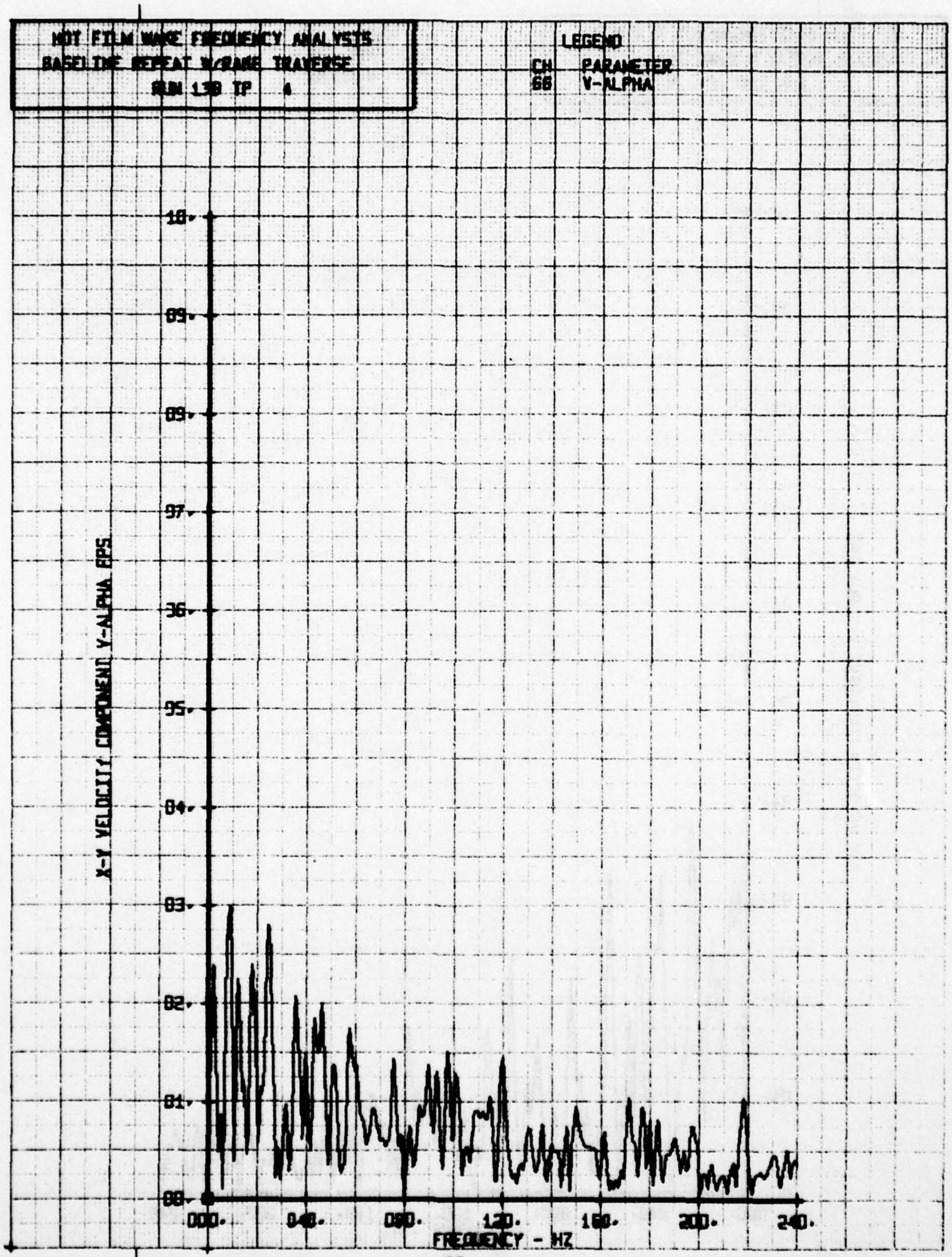
FREQUENCY - HZ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BASELINE REPEAT W/RAKE TRAVERSE
RUN 138 TP 4
LEGEND
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X-Y VELOCITY COMPONENT V-ALPHA RMS
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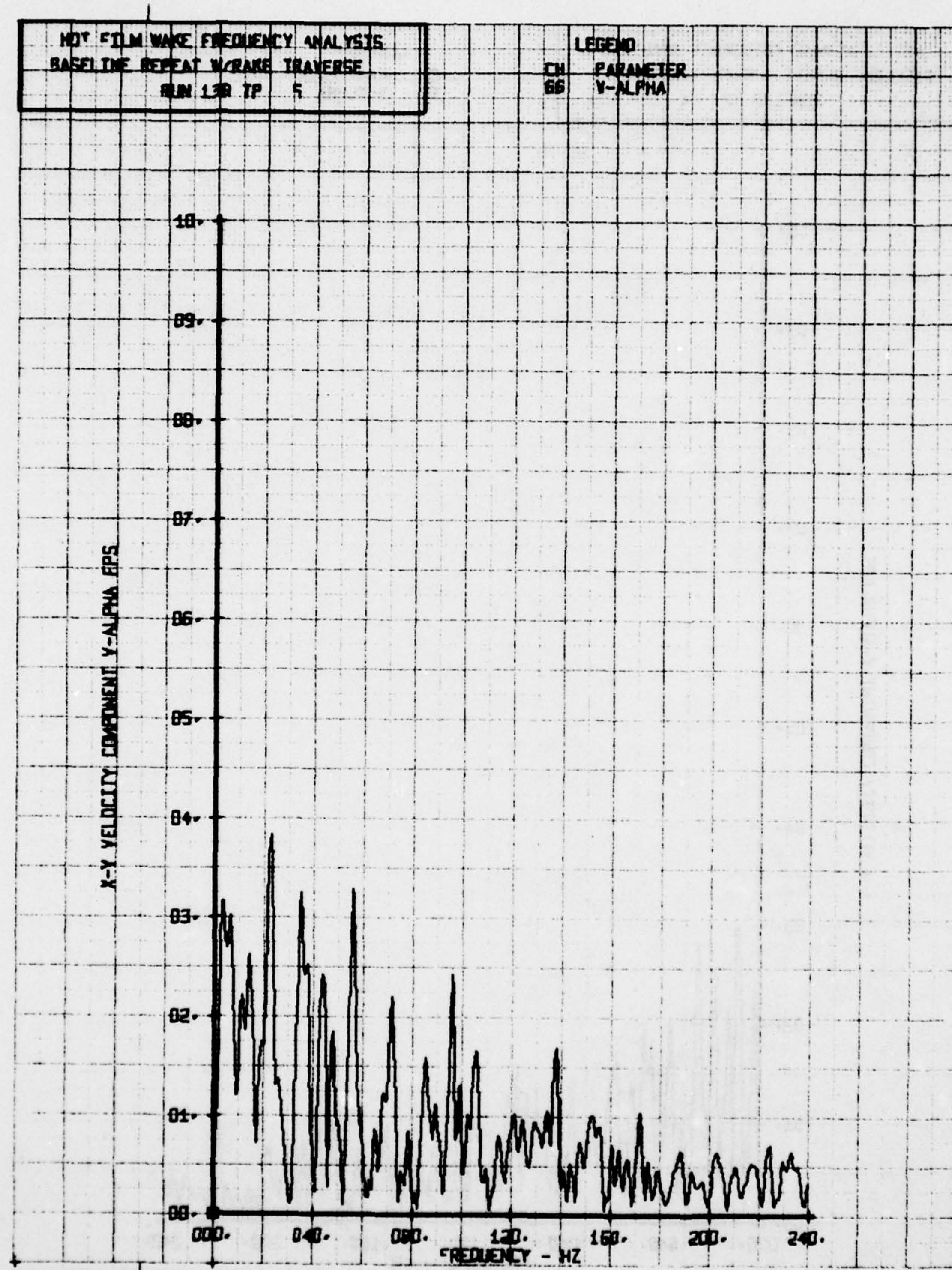
FREQUENCY - HZ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BASELINE REPEAT W/RAKE TRAVERSE
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LEGEND
CH PARAMETER
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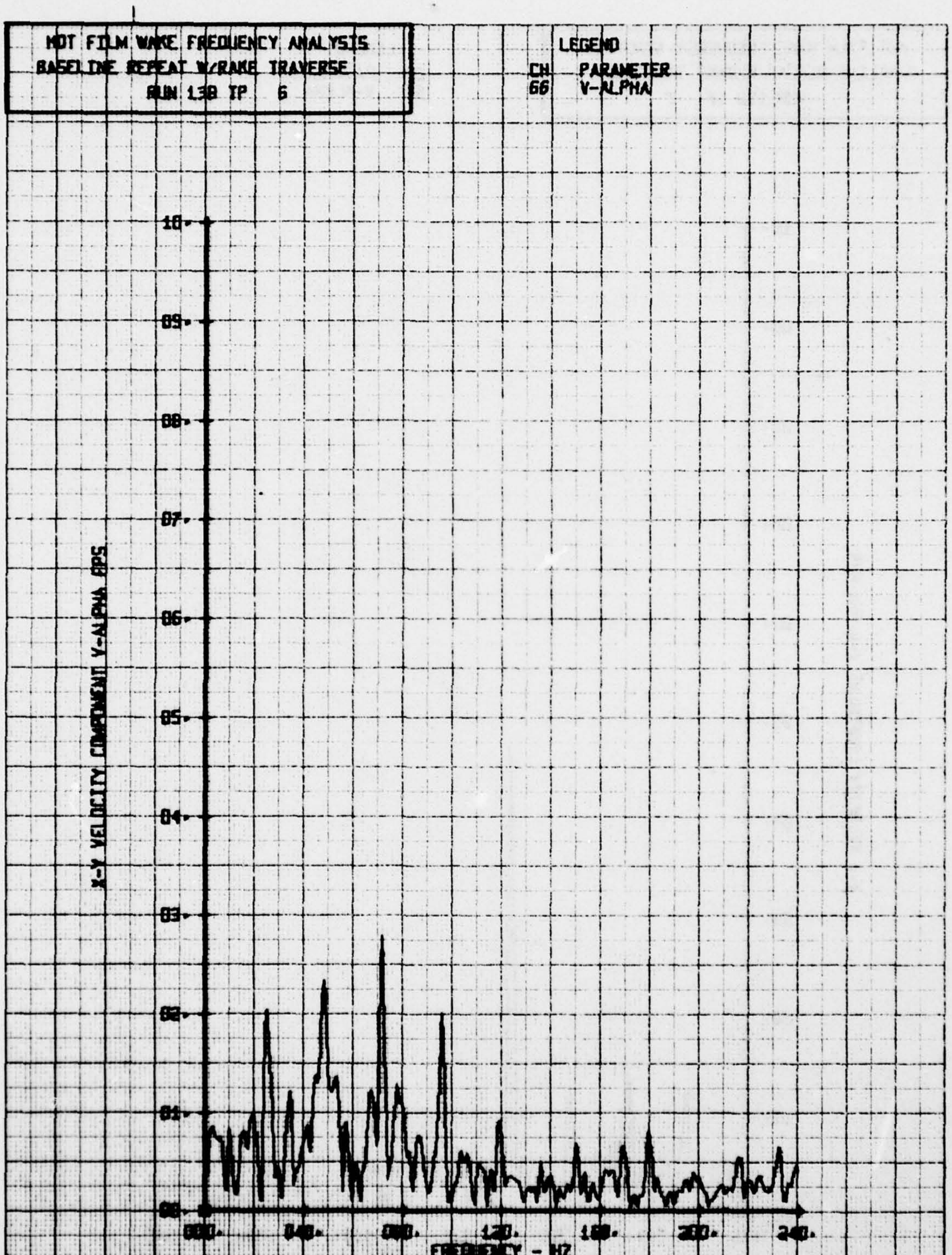
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LEGEND
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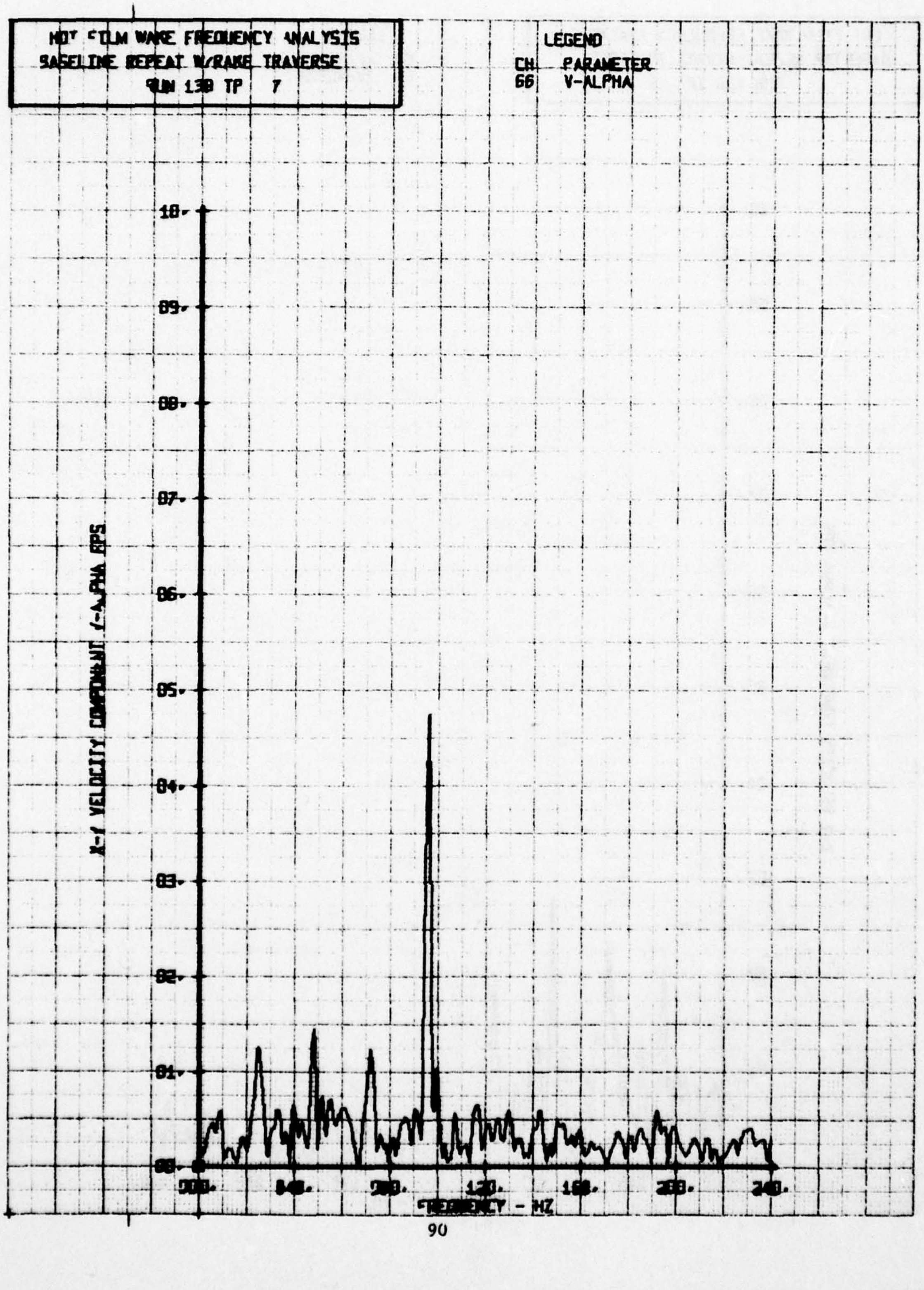
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BASELINE REPEAT W/RAKE TRAVERSE
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LEGEND
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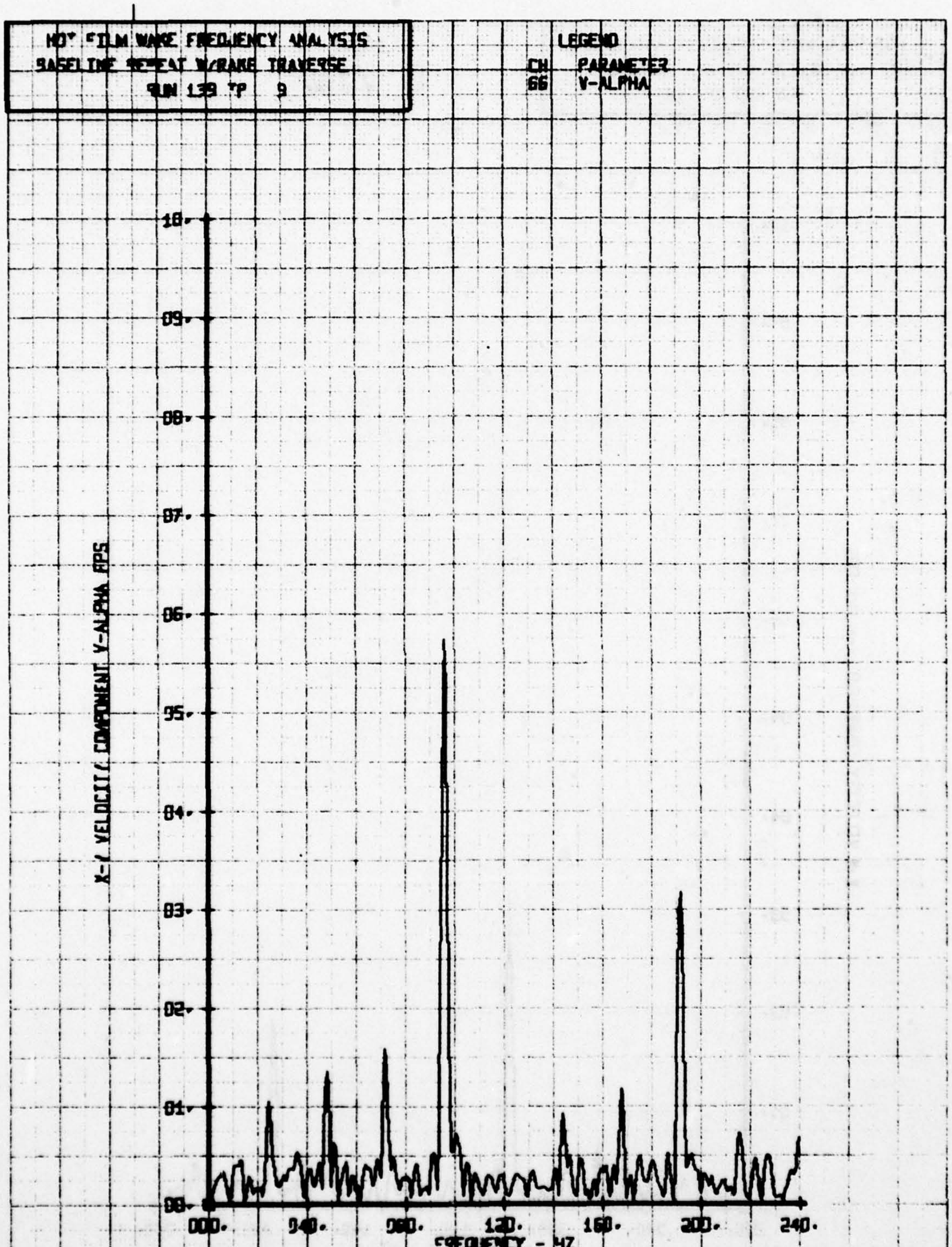
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BASELINE REPEAT W/RAKE TRAVERSE
RUN 139 TP 9
LEGEND
CH PARAMETER
66 V-ALPHA
X-Y VELOCITY COMPONENT V-ALPHA FPS
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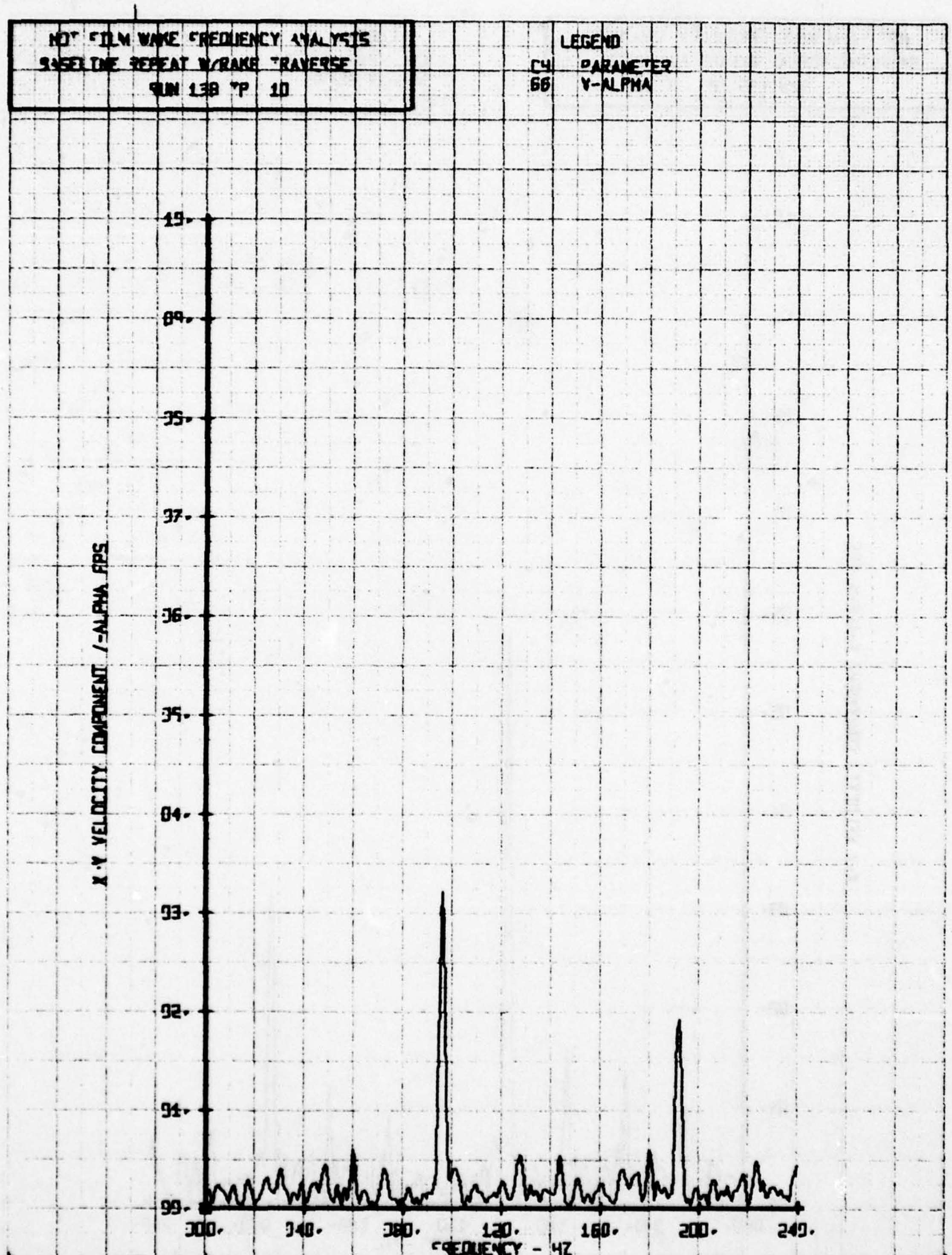
FREQUENCY - HZ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BASELINE REPEAT W/RAKE TRAVERSE
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LEGEND
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X-Y VELOCITY COMPONENT /-ALPHA FPS
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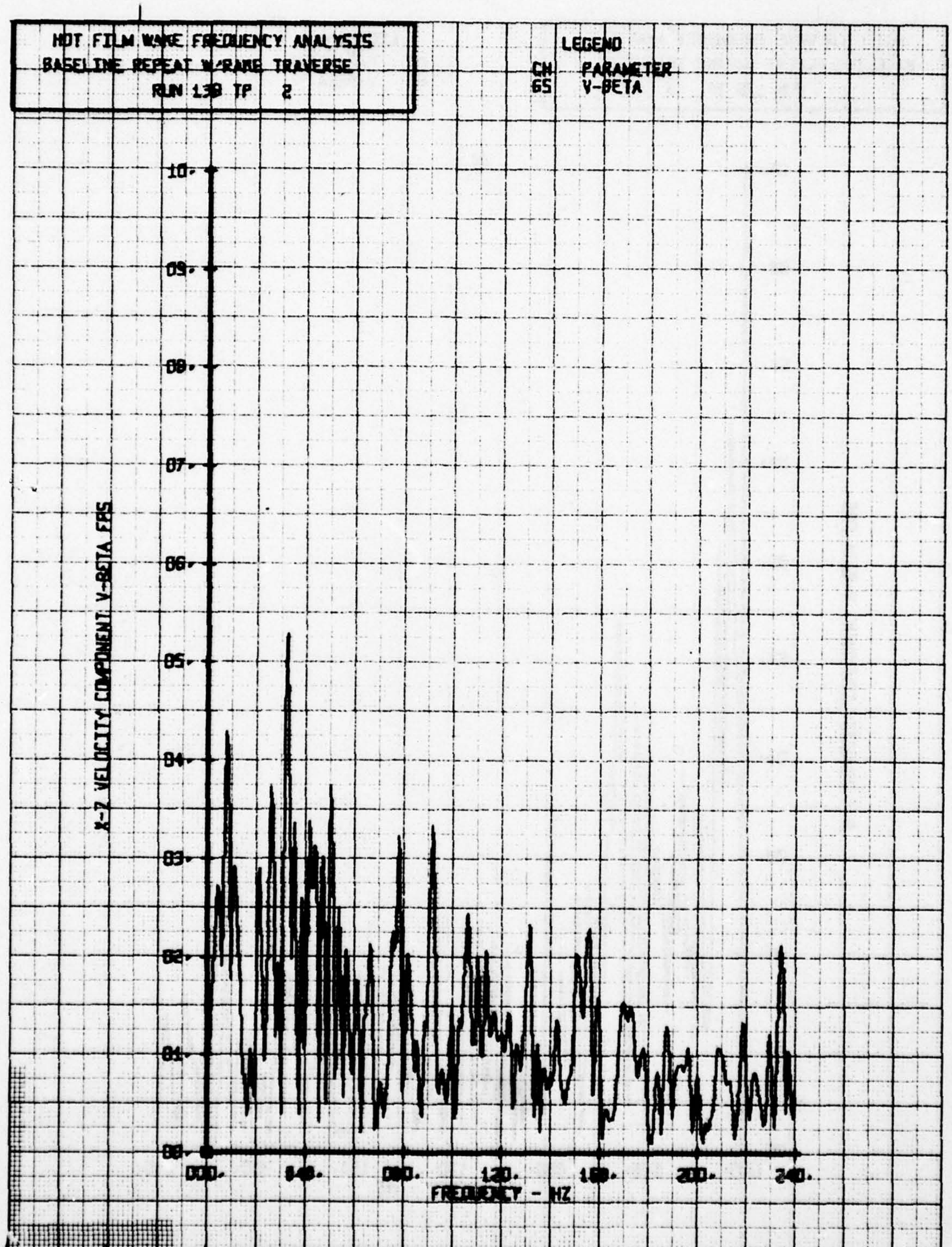
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BASELINE REPEAT W/RAKE TRAVERSE
RUN 139 TP 2
LEGEND
CH PARAMETER
65 V-BETA
X-Z VELOCITY COMPONENT V-BETA FPS
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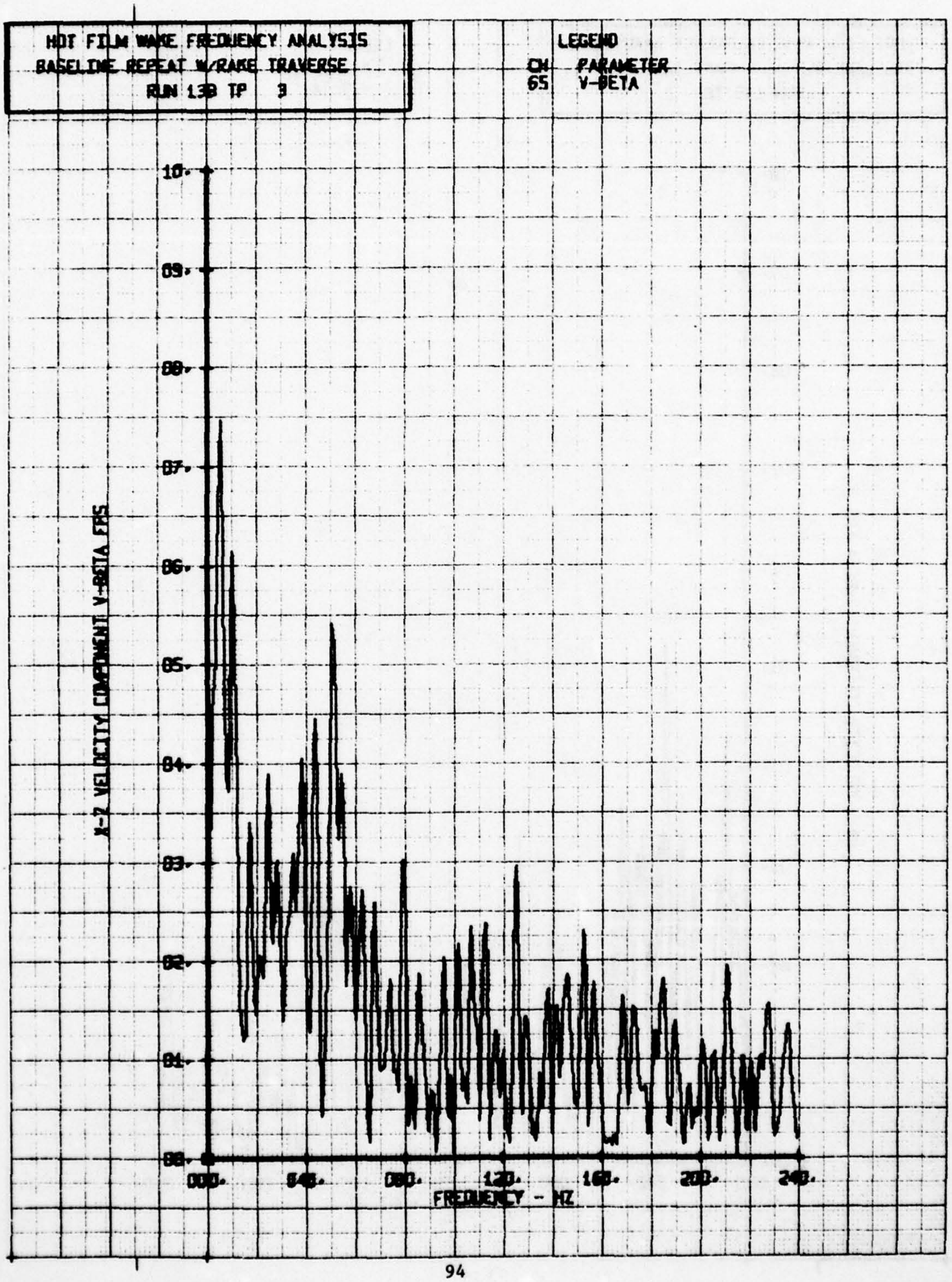
FREQUENCY - HZ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BASELINE REPEAT W/RAKE TRAVERSE
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LEGEND
CH PARAMETER
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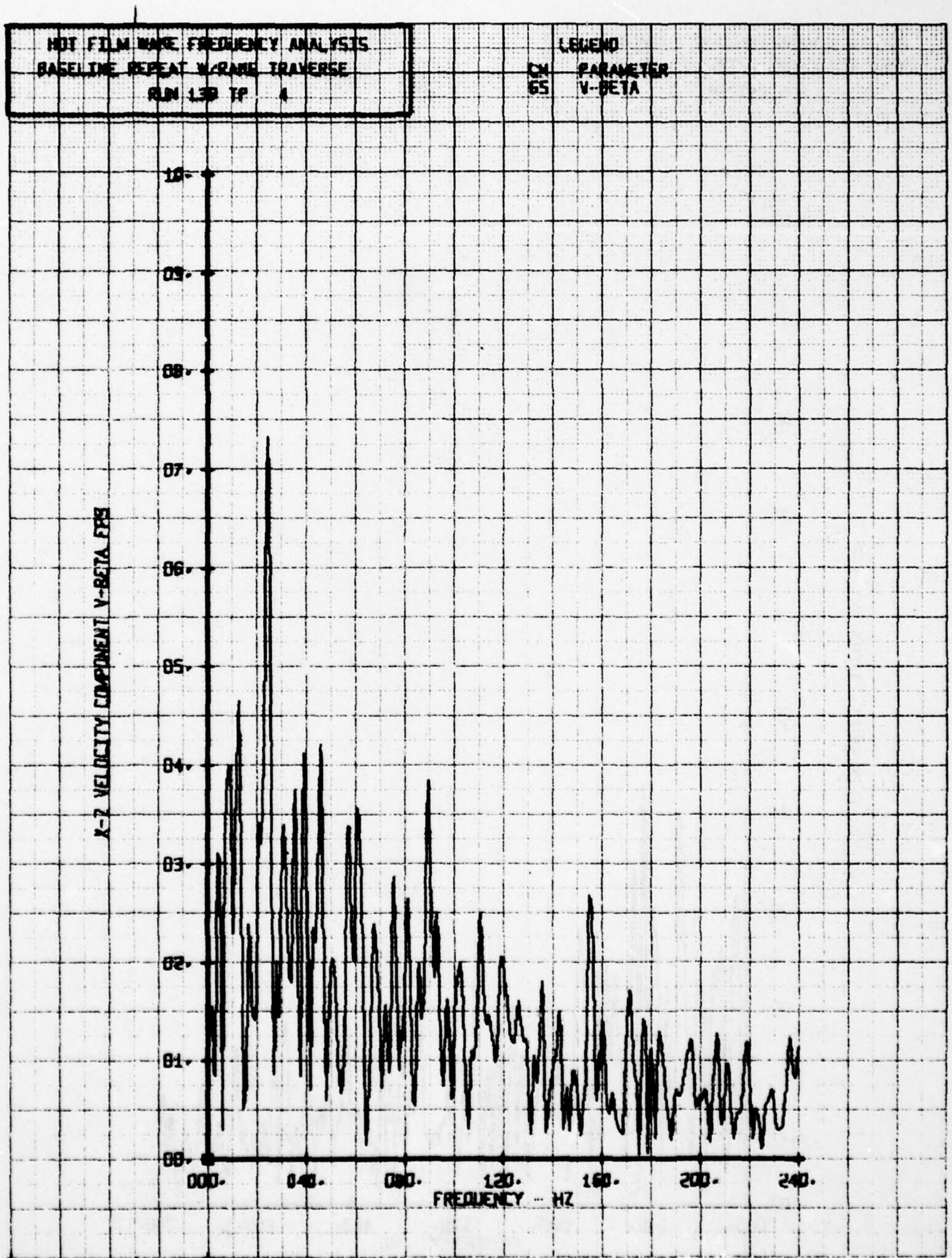
X-Z VELOCITY COMPONENT V-BETA FPS
FREQUENCY - HZ



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BASELINE REPEAT W/RAKE TRAVERSE
RUN 138 TP 4
LEGEND
CN PARAMETER
65 V-BETA
X-Z VELOCITY COMPONENT V-BETA FPS
FREQUENCY -- HZ

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INTERACTIONAL AERODYNAMICS OF THE SINGLE ROTOR HELICOPTER CONFI--ETC(U)
SEP 78 P F SHERIDAN DAAJ02-77-C-0020
UNCLASSIFIED USARTL-TR-78-23G-V-7G NL

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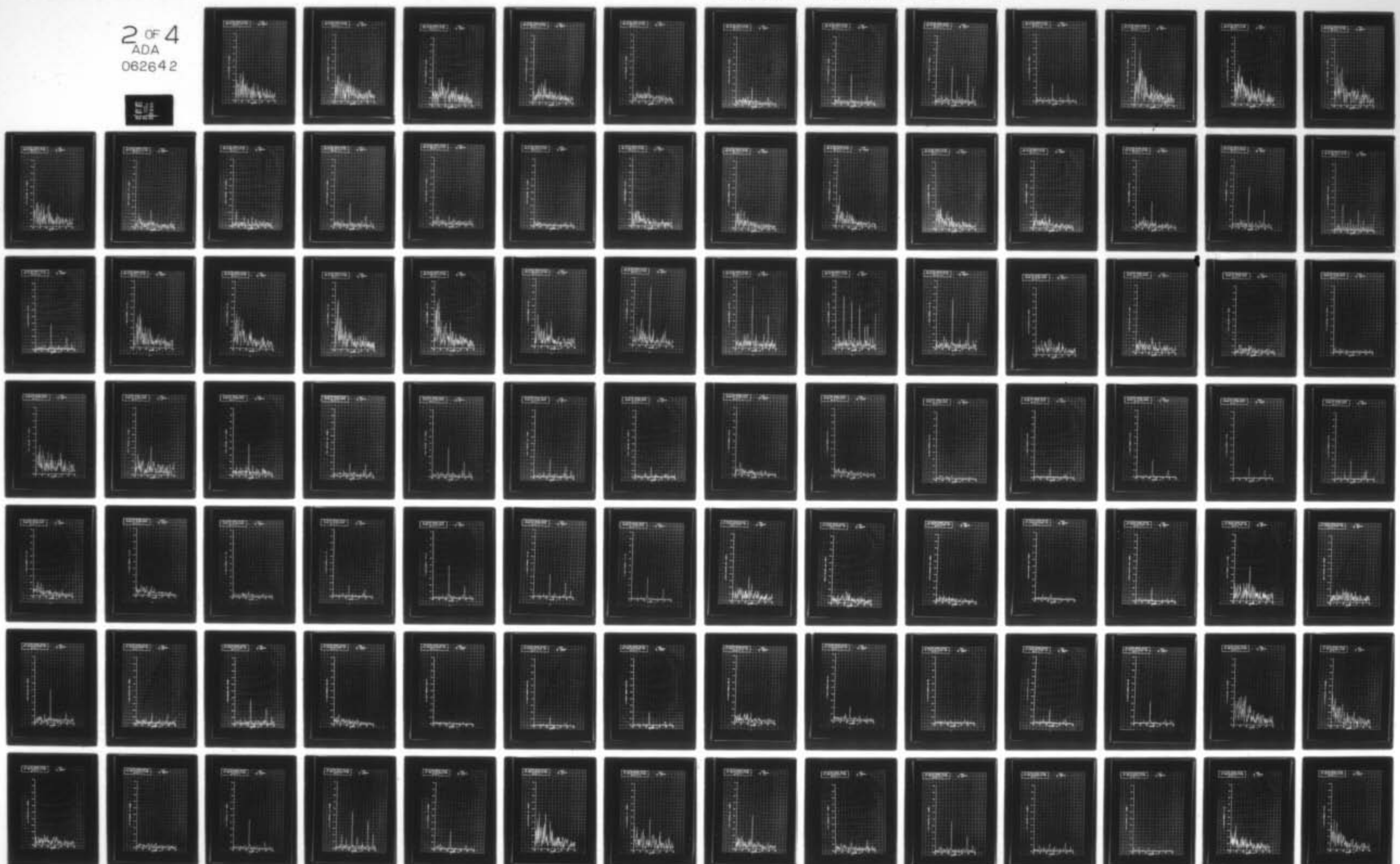

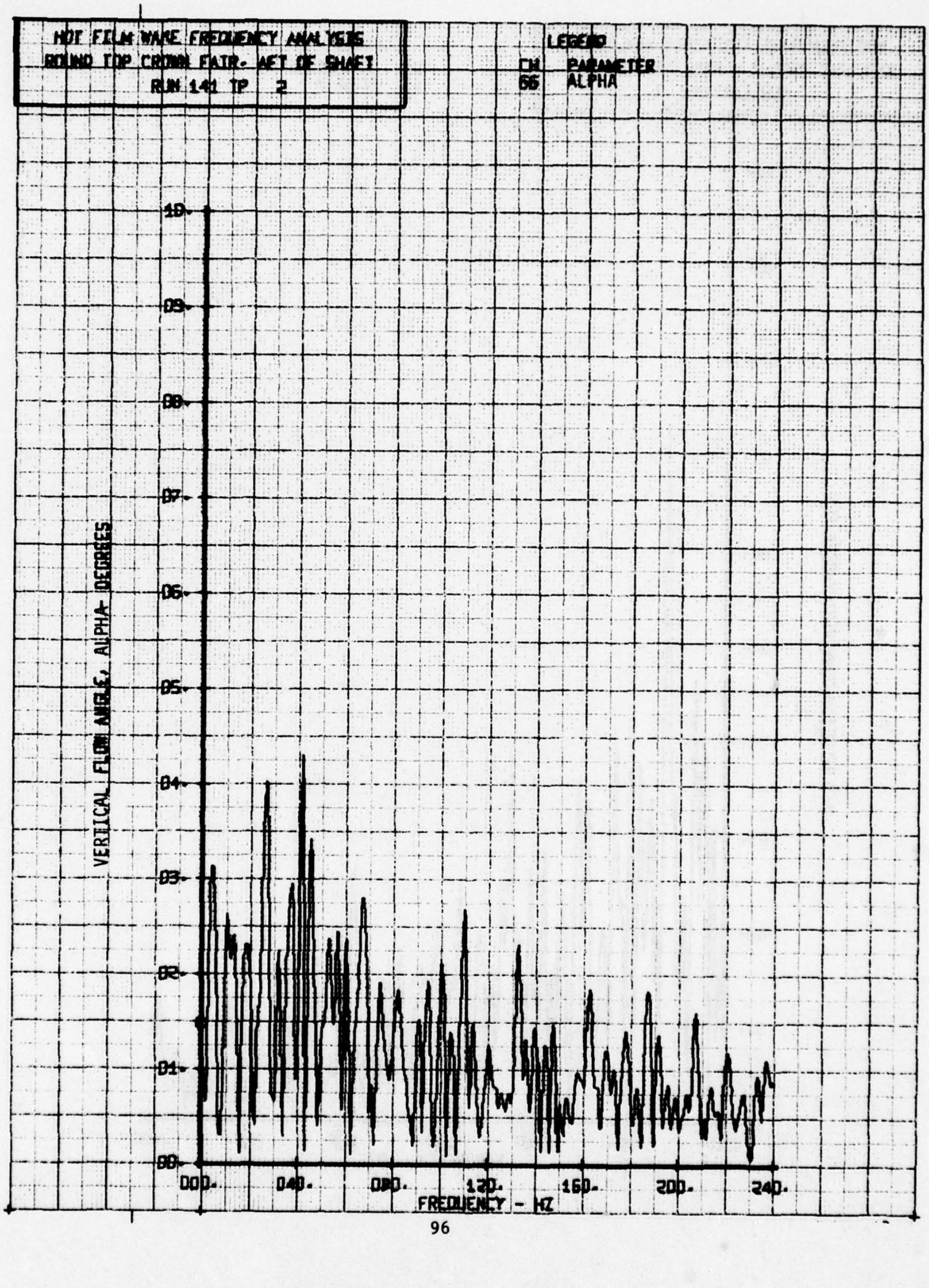
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ROUND TOP CROWN FAIR. AFT OF SHAFT
RUN 141 TP 2
LEGEND
CH PARAMETER
66 ALPHA
VERTICAL FLOW ANGLE, ALPHA- DEGREES
FREQUENCY - HZ
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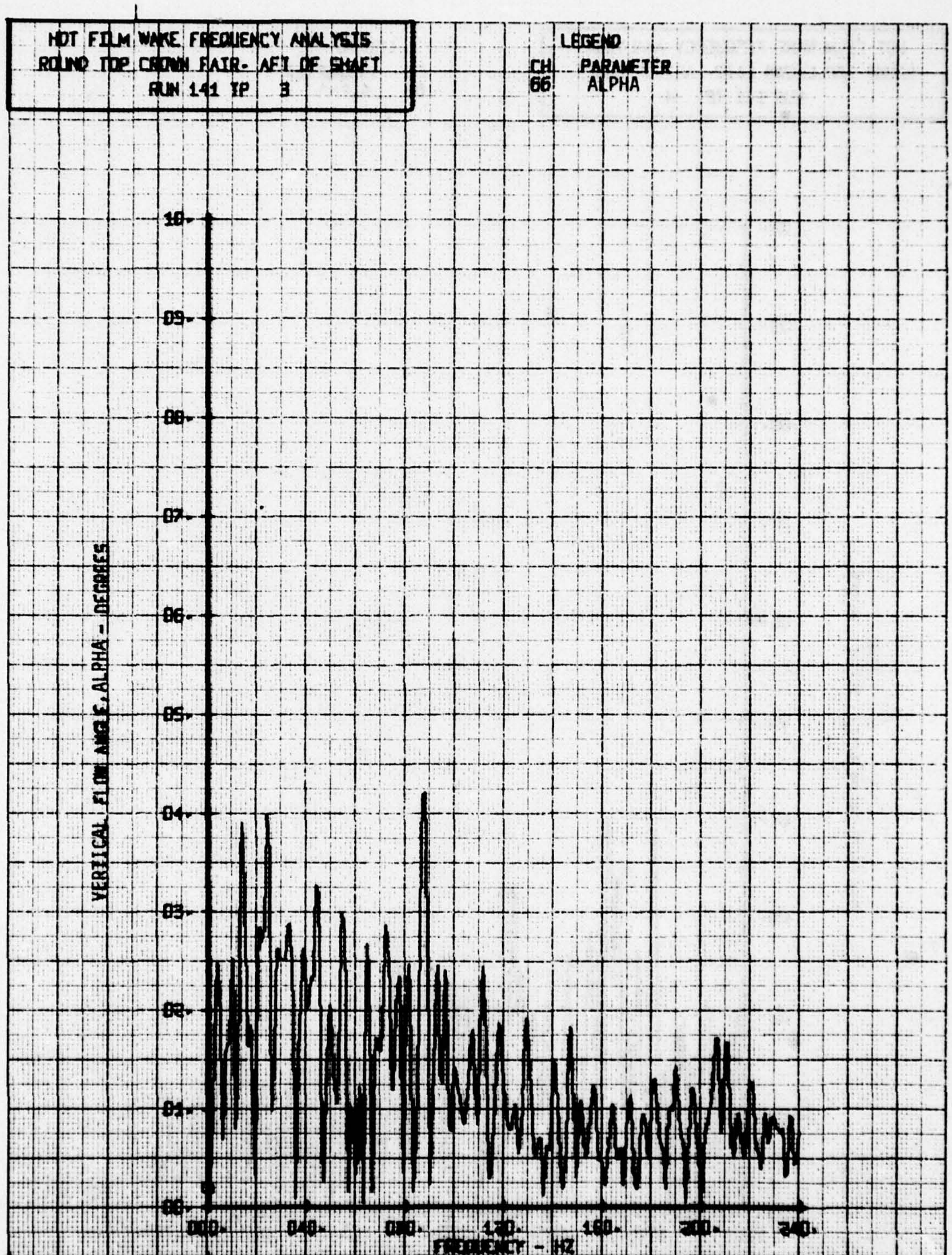
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ROUND TOP CROWN FAIR- AFT OF SHAFT
RUN 141 TP 3
LEGEND
CH PARAMETER
66 ALPHA
VERTICAL FLOW ANGLE, ALPHA - DEGREES
FREQUENCY - HZ
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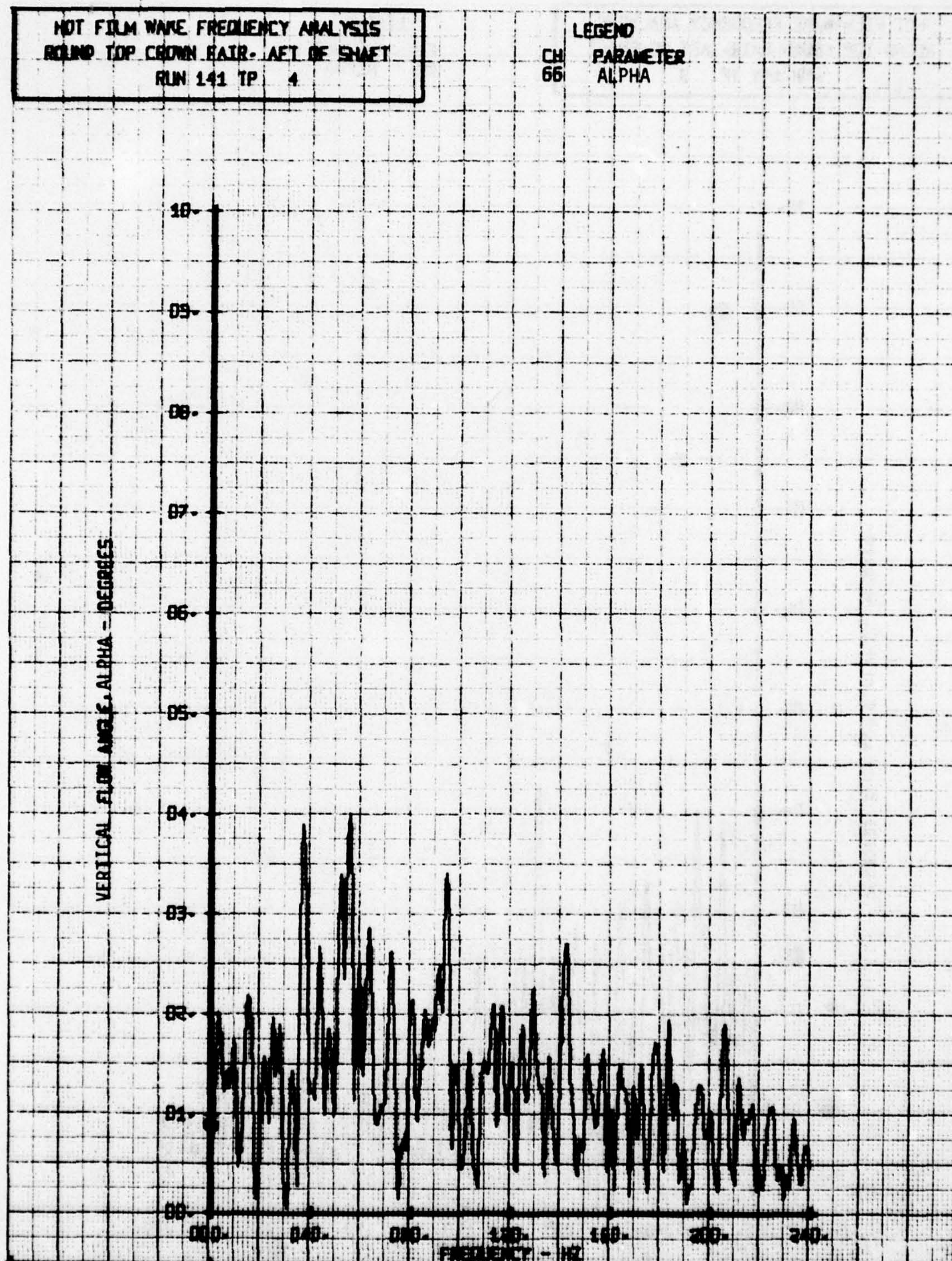

HOT FILM WAKE FREQUENCY ANALYSIS
ROUND TOP CROWN FAIR- AFT OF SHAFT
RUN 141 TP 4
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CH PARAMETER
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VERTICAL FLOW ANGLE,ALPHA - DEGREES
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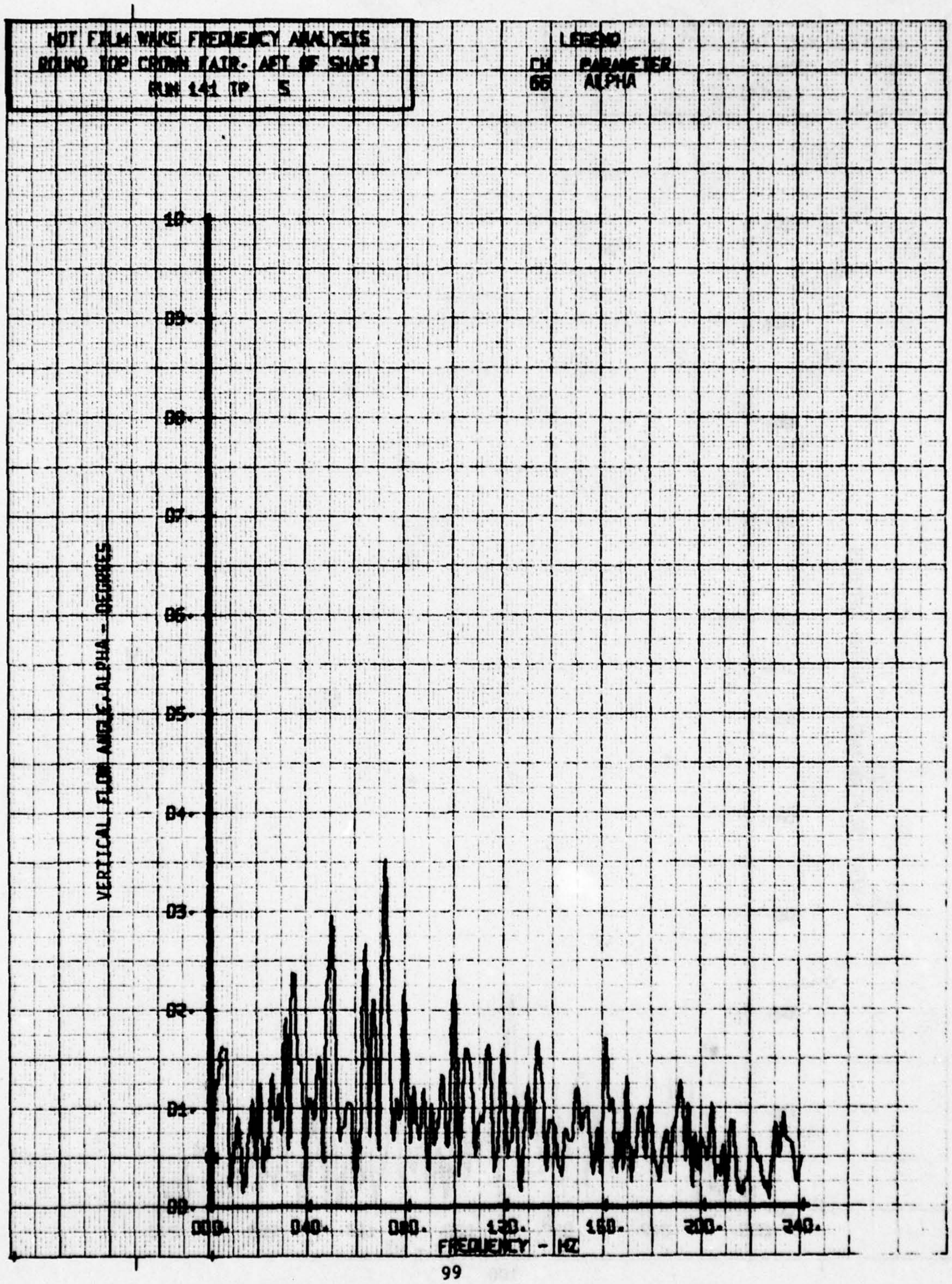
FREQUENCY - HZ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ROUND TOP CROWN FAIR. AFT OF SHAFT
RUN 141 TP 5
LEGEND
CH PARAMETER
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VERTICAL FLOW ANGLE, ALPHA - DEGREES
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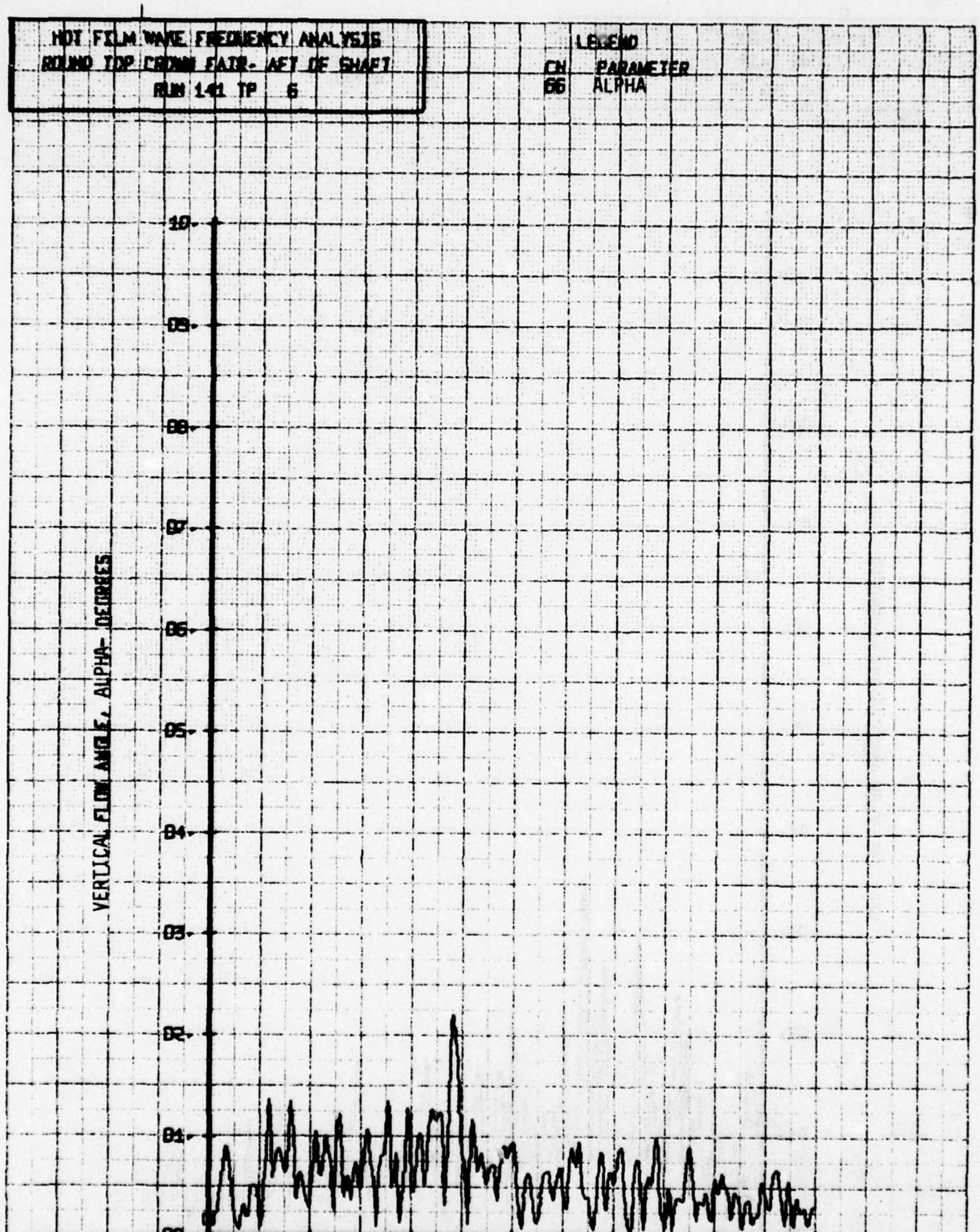
FREQUENCY - HZ



HOT FILM WAKE FREQUENCY ANALYSIS
ROUND TOP CROWN FAIR- AFT OF SHAFT
RUN 141 TP 6
LEGEND
CH PARAMETER
66 ALPHA
VERTICAL FLOW ANGLE, ALPHA- DEGREES
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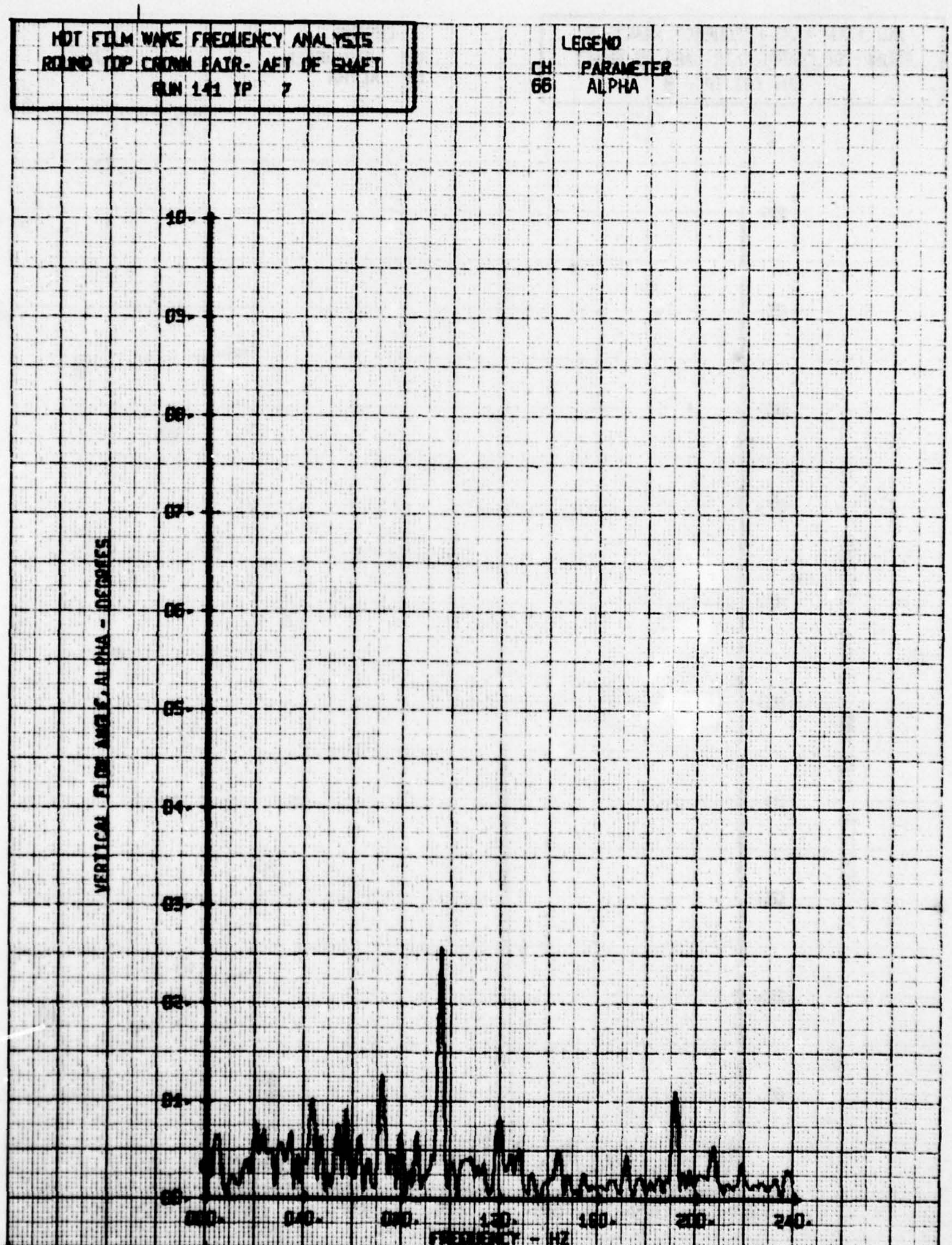
FREQUENCY - HZ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RUN 141 TP 7
LEGEND
CH PARAMETER
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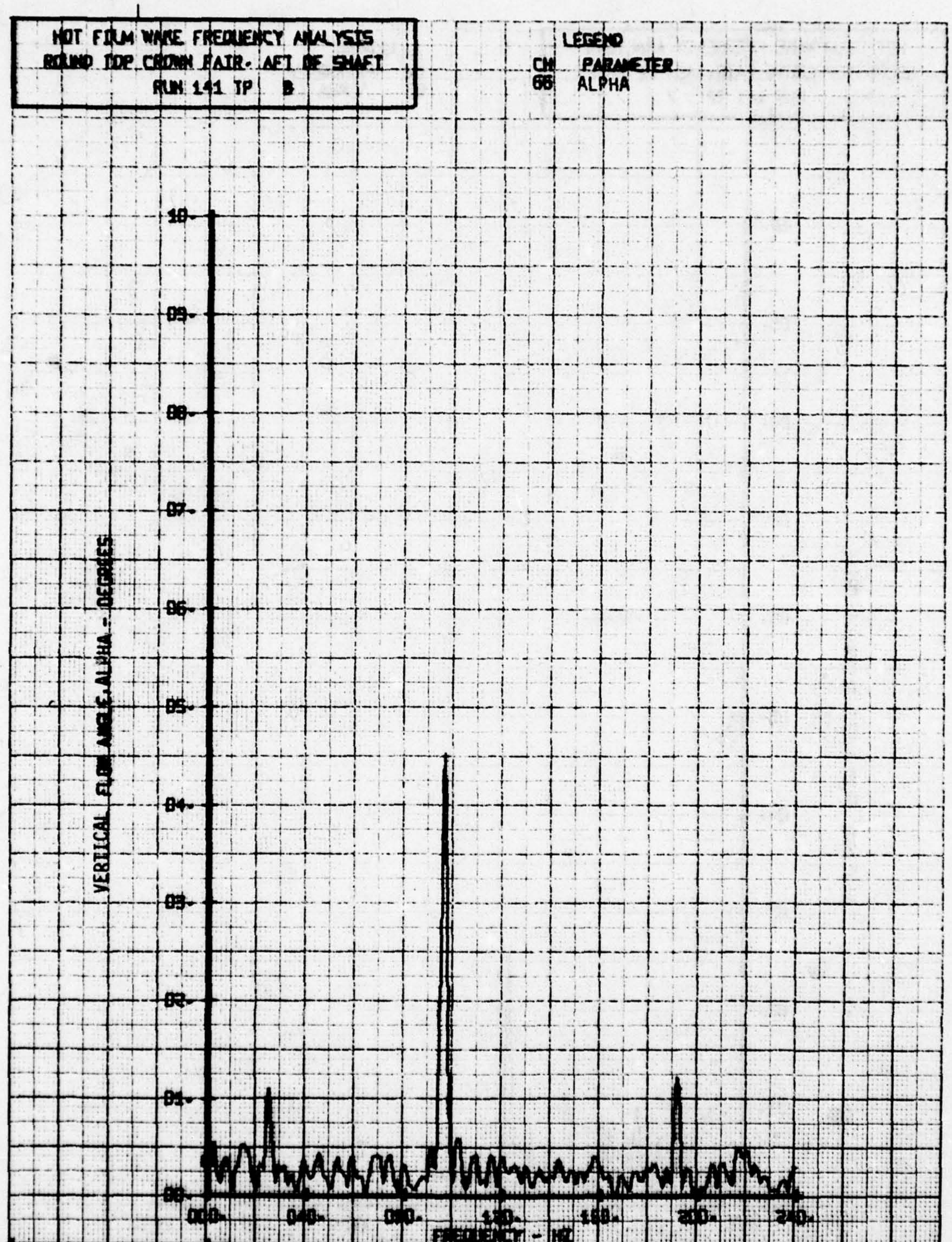
VERTICAL FLOW ANGLE,ALPHA - DEGREES
FREQUENCY - HZ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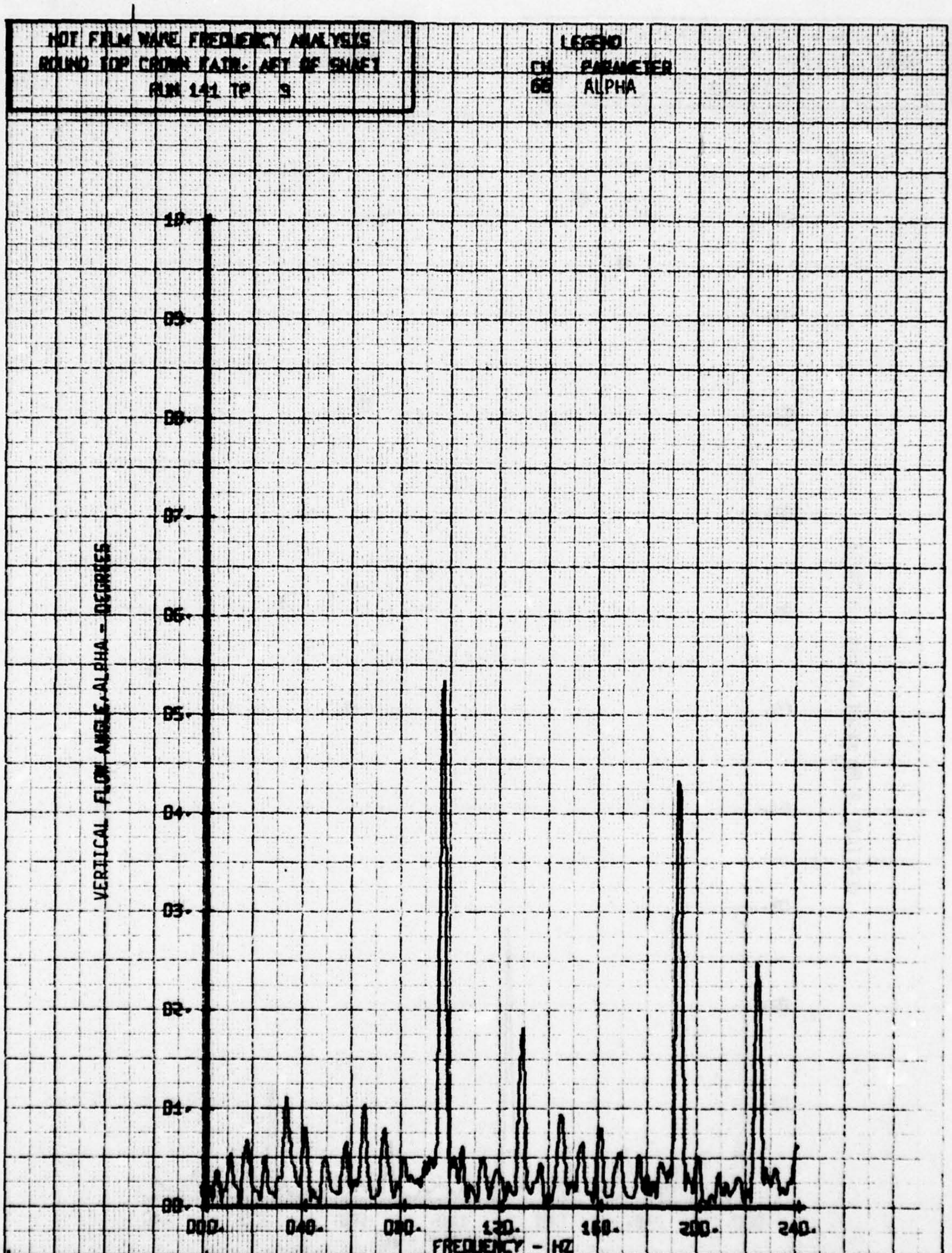
ROUND TOP CROWN FAIR. AFT OF SHAFT
RUN 141 TP B
LEGEND
CH PARAMETER
66 ALPHA
VERTICAL FLOW ANGLE,ALPHA - DEGREES
FREQUENCY - HZ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ROUND TOP CROWN FAIR. AFT OF SHAFT
RUN 141 TP 9
LEGEND
CH PARAMETER
68 ALPHA
VERTICAL FLOW ANGLE,ALPHA - DEGREES
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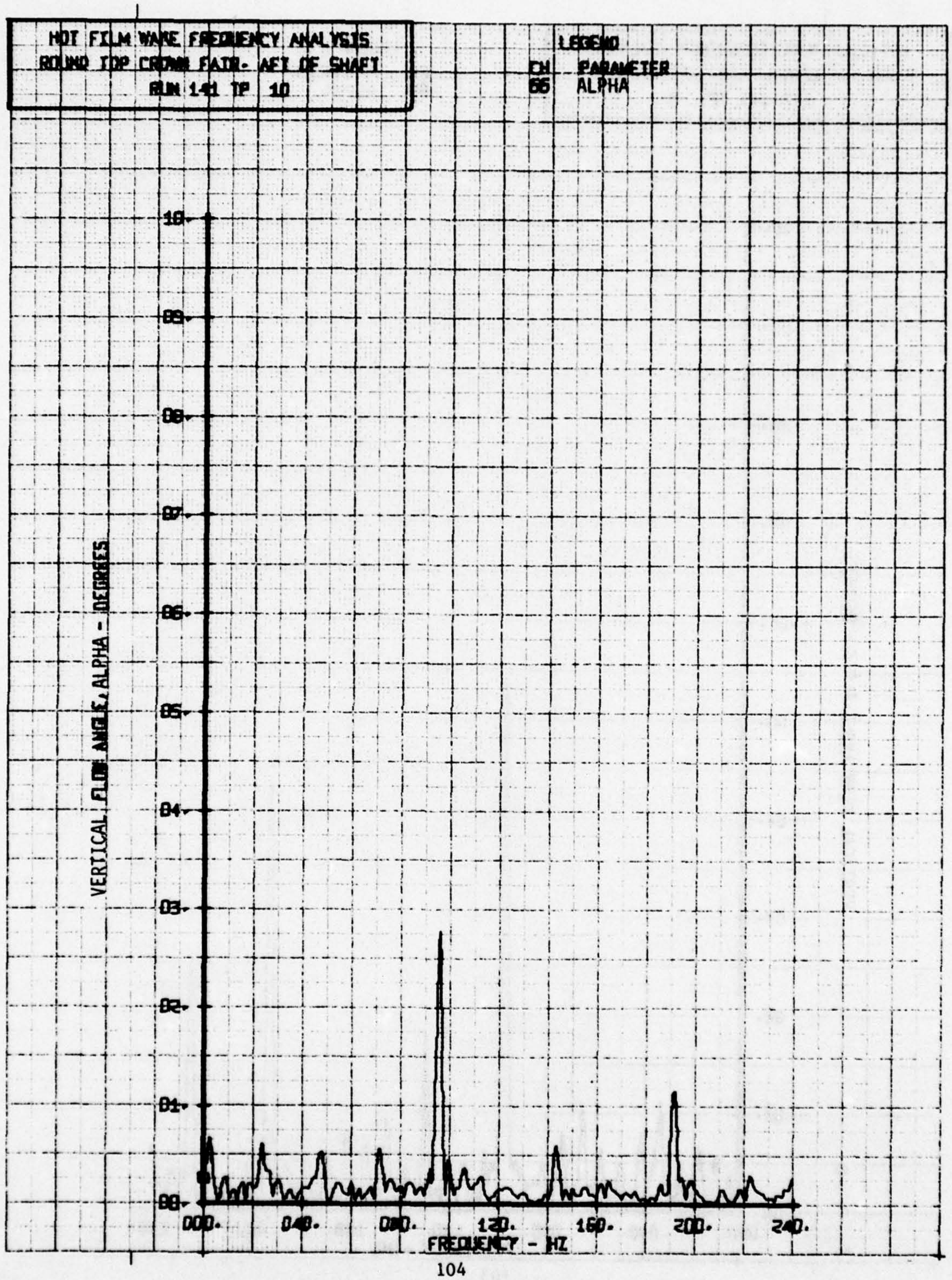
FREQUENCY - HZ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RUN 141 TP 10
LEGEND
CH PARAMETER
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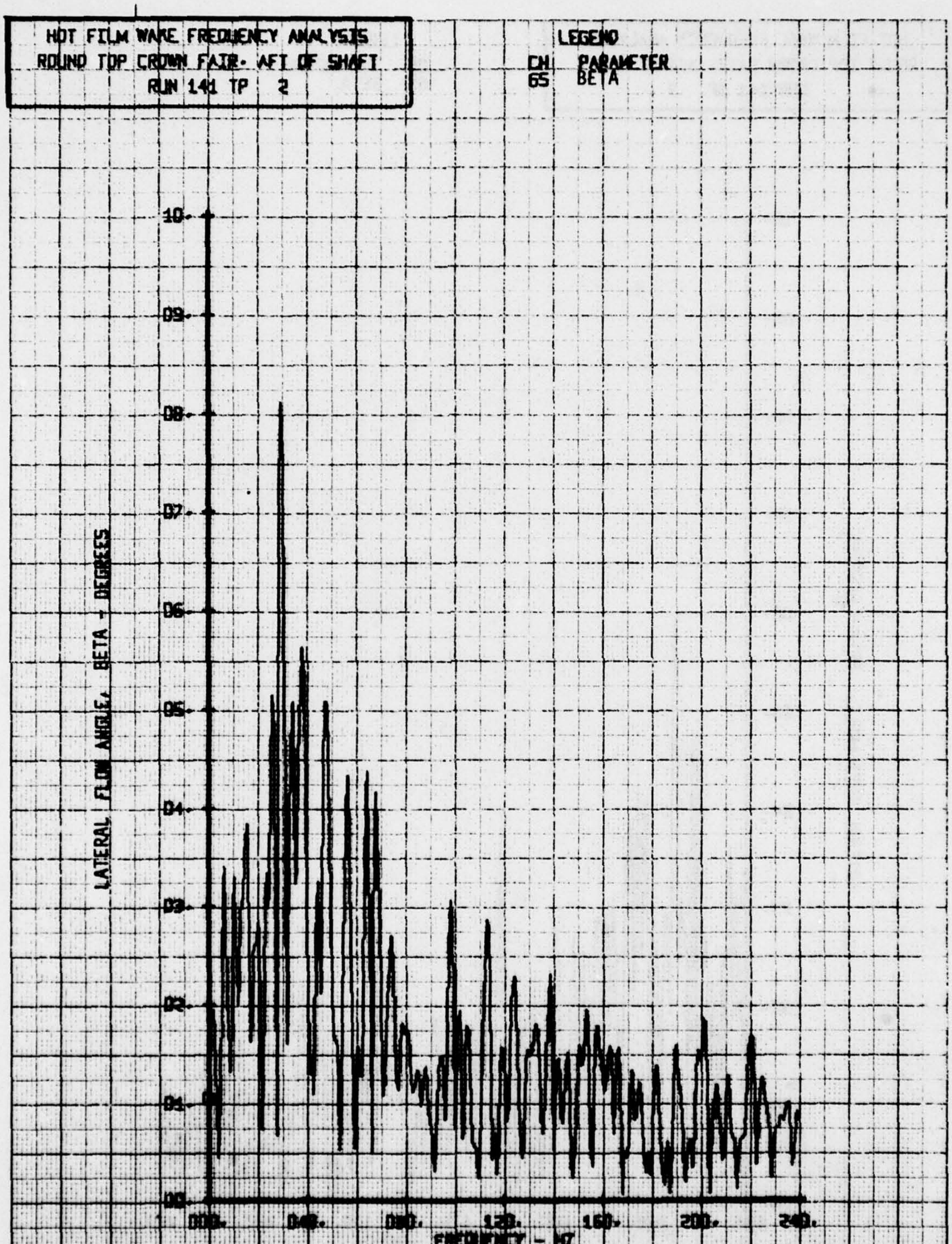
VERTICAL FLOW ANGLE, ALPHA - DEGREES
FREQUENCY - HZ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ROUND TOP CROWN FAIR. AFT OF SHAFT
RUN 141 TP 2
LEGEND
CH PARAMETER
65 BETA
LATERAL FLOW ANGLE, BETA - DEGREES
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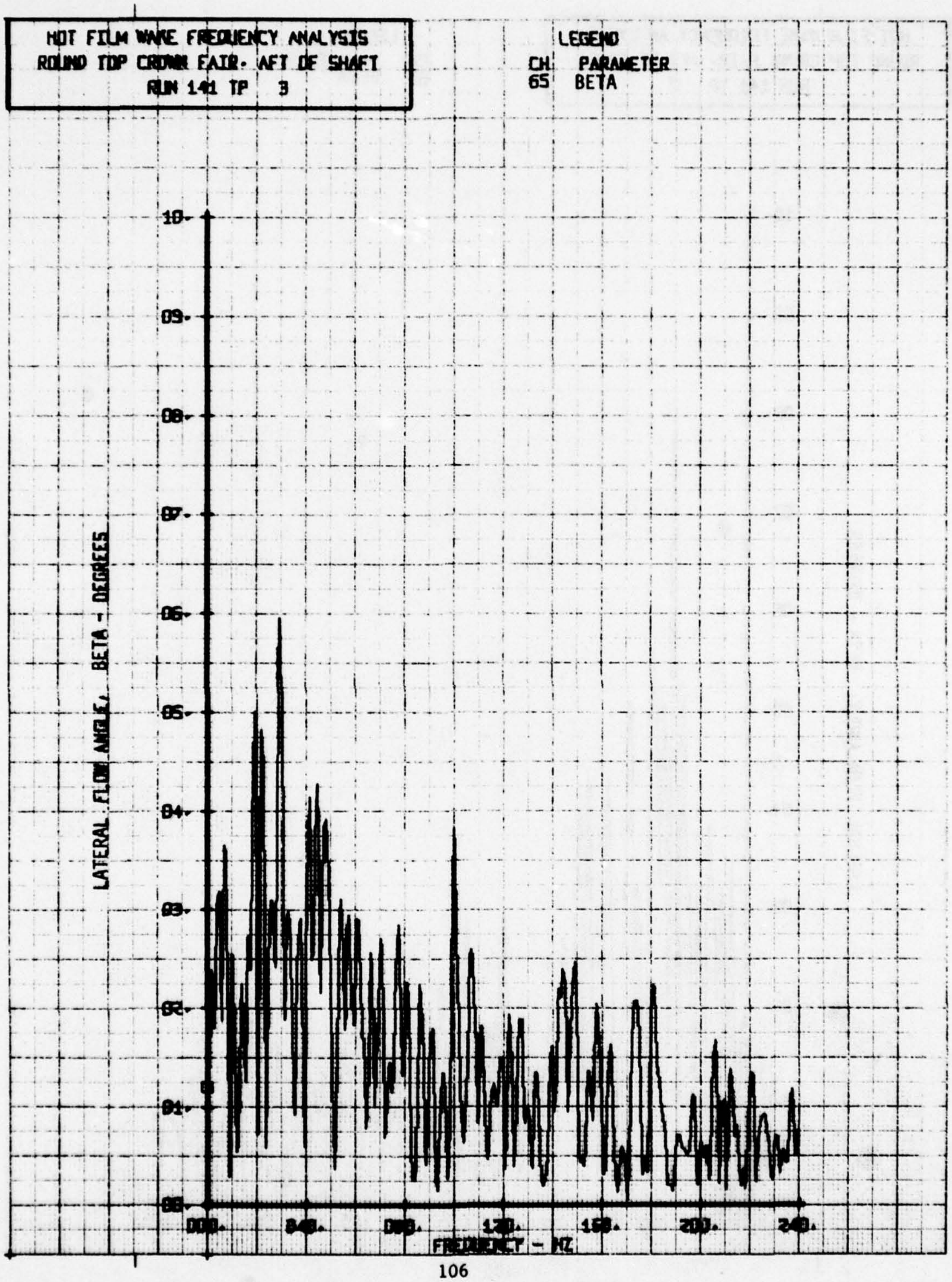
FREQUENCY - HZ



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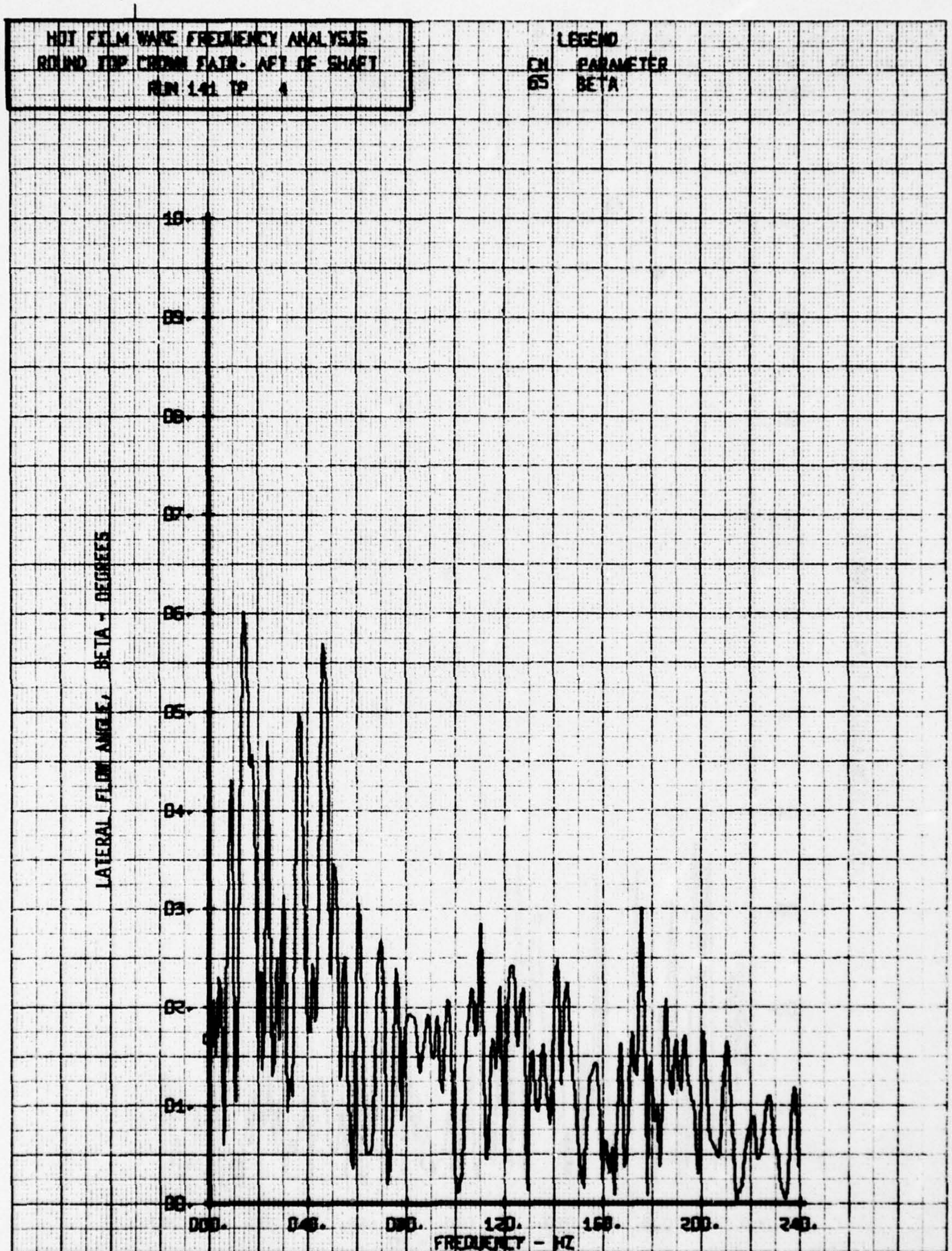
LATERAL FLOW ANGLE, BETA - DEGREES
FREQUENCY - HZ



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ROUND TOP CROWN FAIR. AFT OF SHAFT
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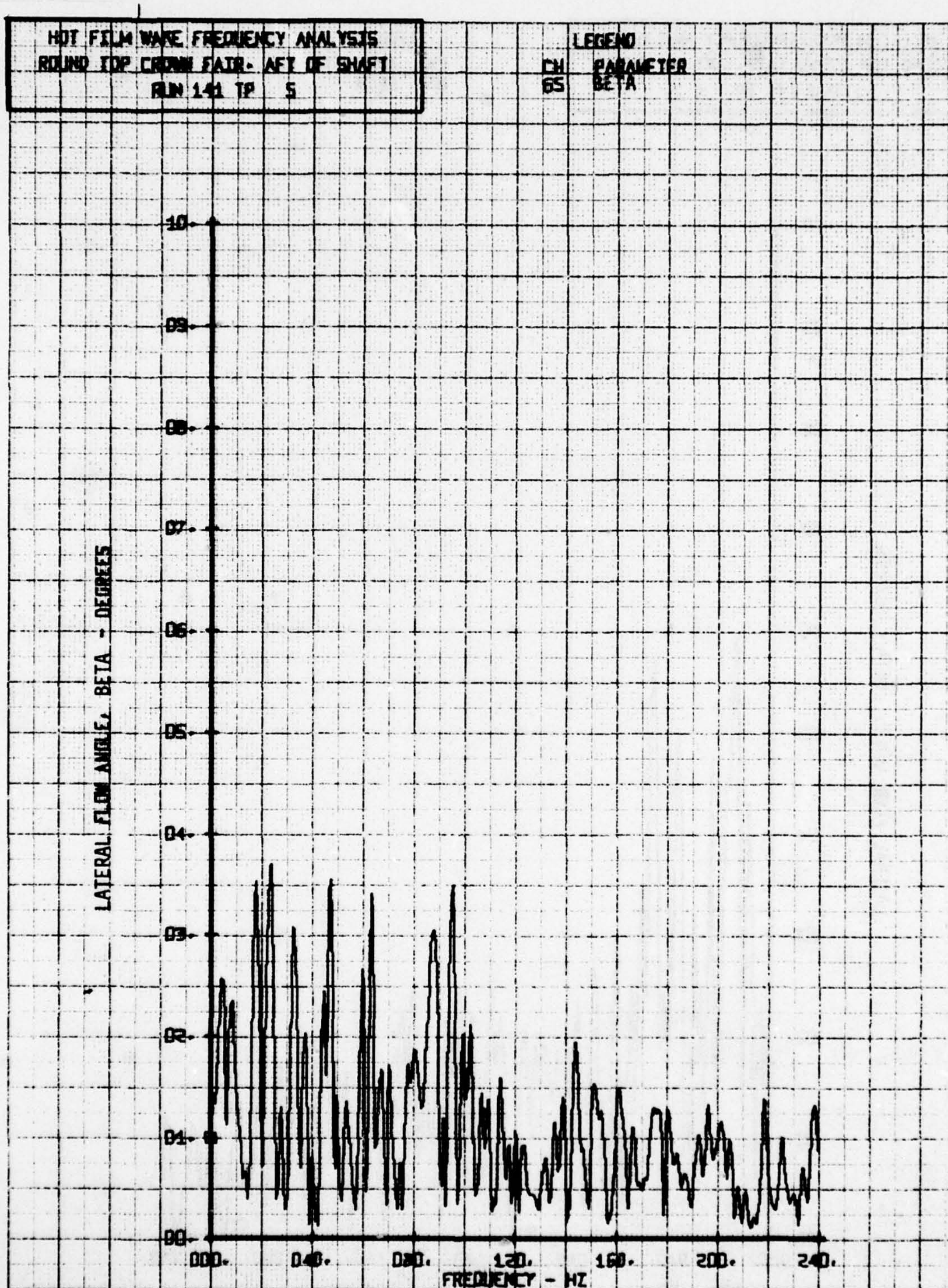
LATERAL FLOW ANGLE, BETA - DEGREES
FREQUENCY - HZ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ROUND TOP CROWN FAIR. AFT OF SHAFT
RUN 141 TP 5
LEGEND
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LATERAL FLOW ANGLE, BETA - DEGREES
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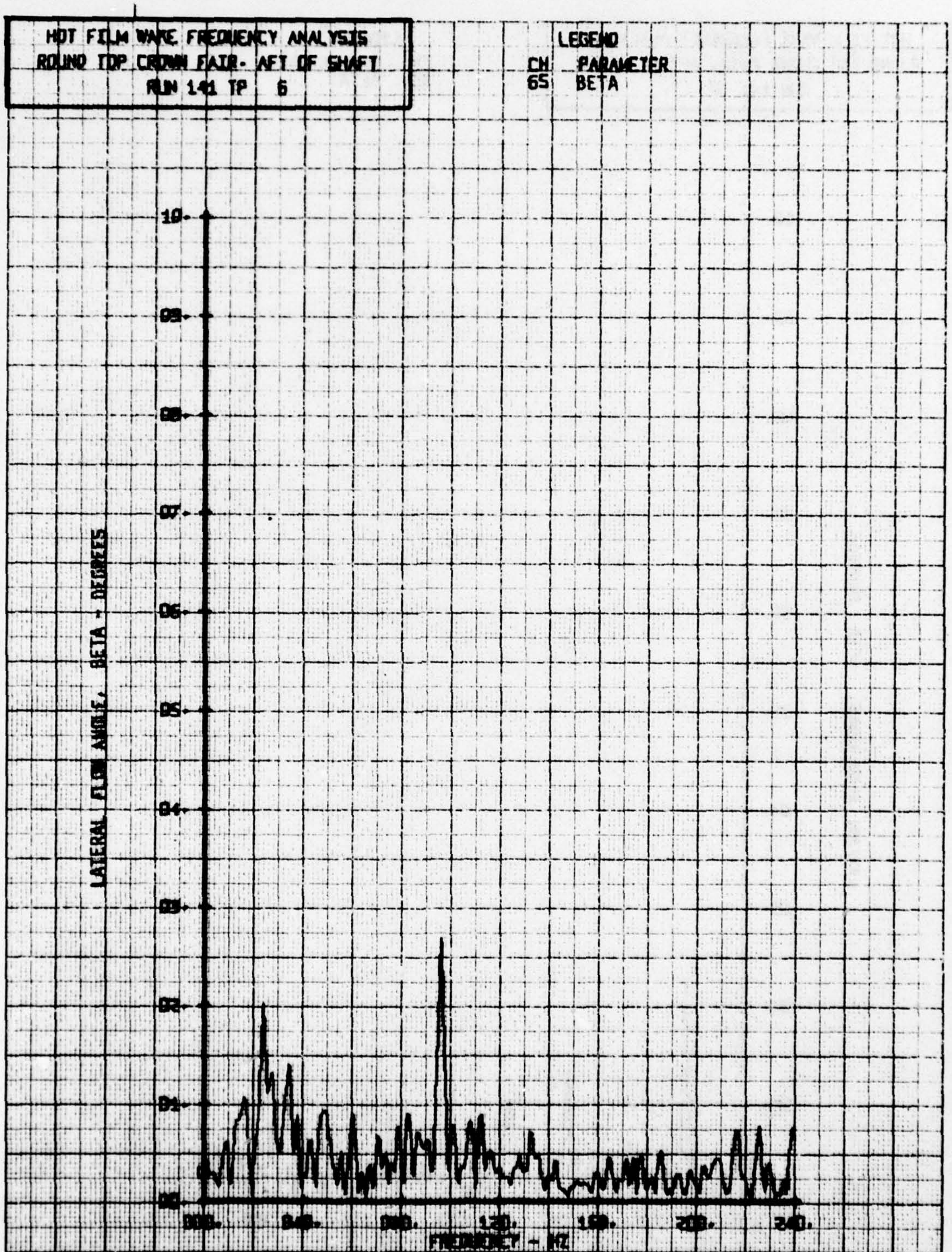
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ROUND TOP CROWN FAIR- AFT OF SHAFT
RUN 141 TP 6
LEGEND
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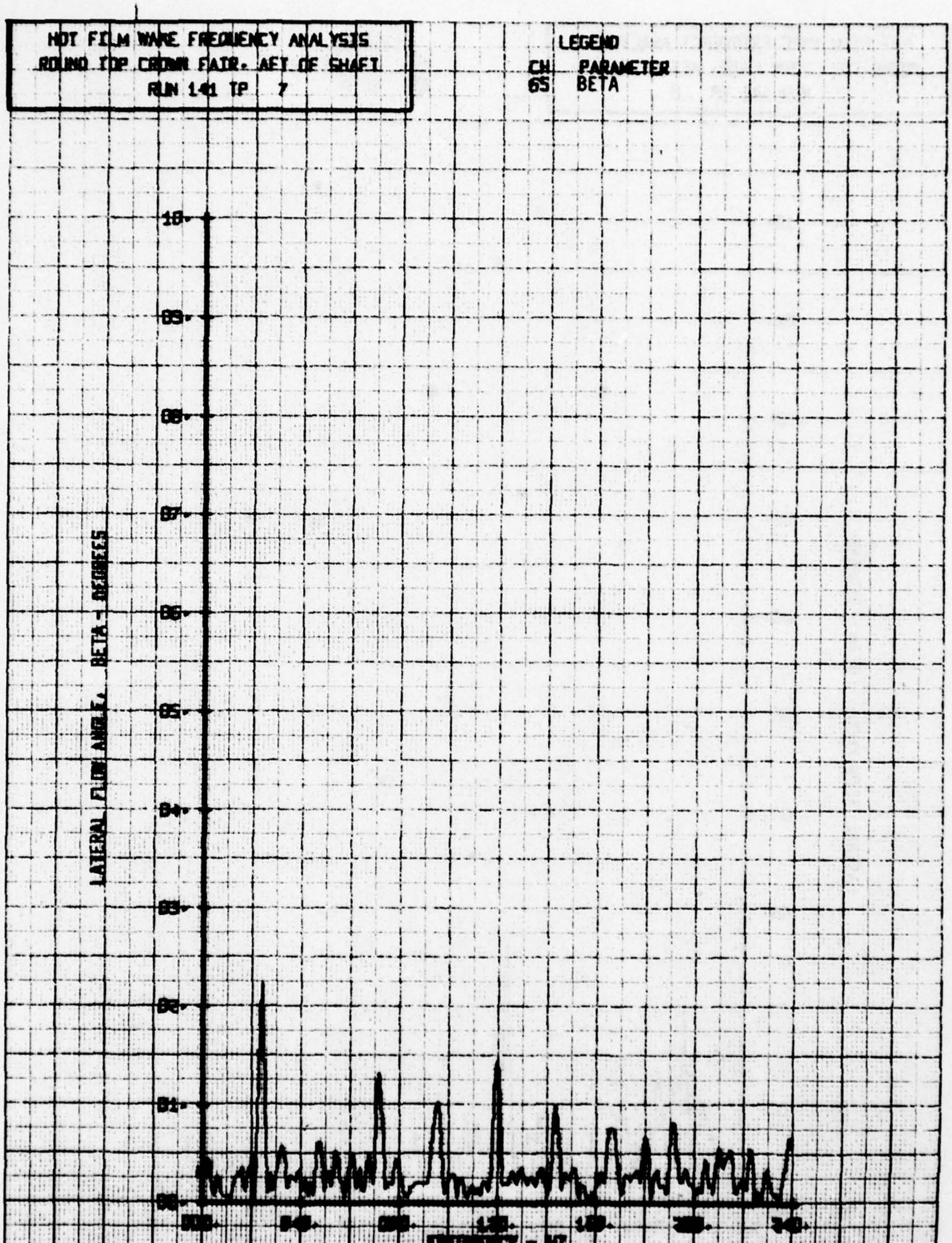
LATERAL FLOW ANGLE, BETA - DEGREES
FREQUENCY - HZ



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ROUND TOP CROWN FAIR, AFT OF SHAFT
RUN 141 TP 7
LEGEND
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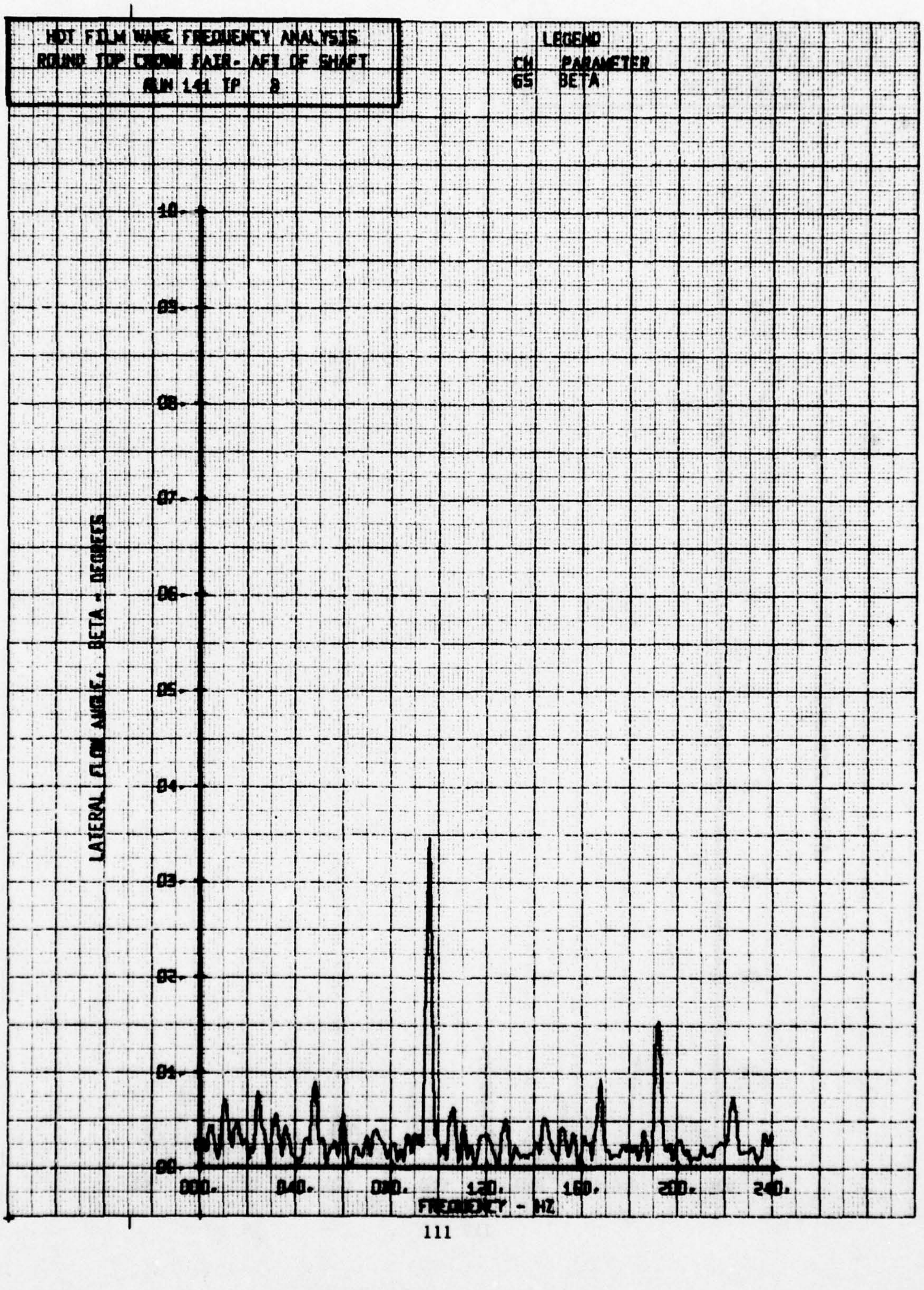
LATERAL FLOW ANGLE, BETA - DEGREES
FREQUENCY - HZ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ROUND TOP CROWN FAIR- AFT OF SHAFT
RUN 141 TP 8
LEGEND
CH PARAMETER
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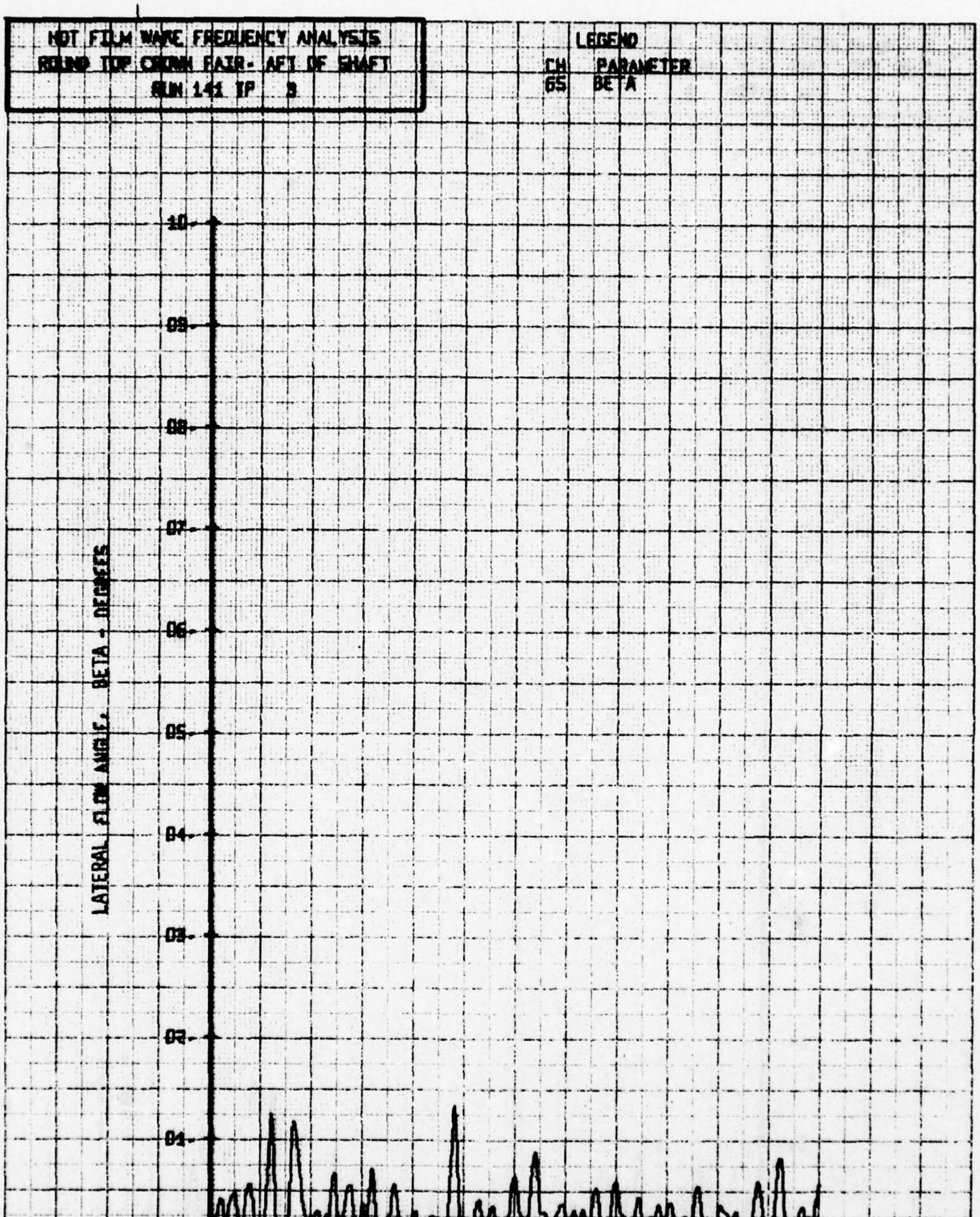
FREQUENCY - HZ



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ROUND TOP CROWN FAIR- AFT OF SHAFT
RUN 141 TP 3
LEGEND
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LATERAL FLOW ANGLE, BETA - DEGREES
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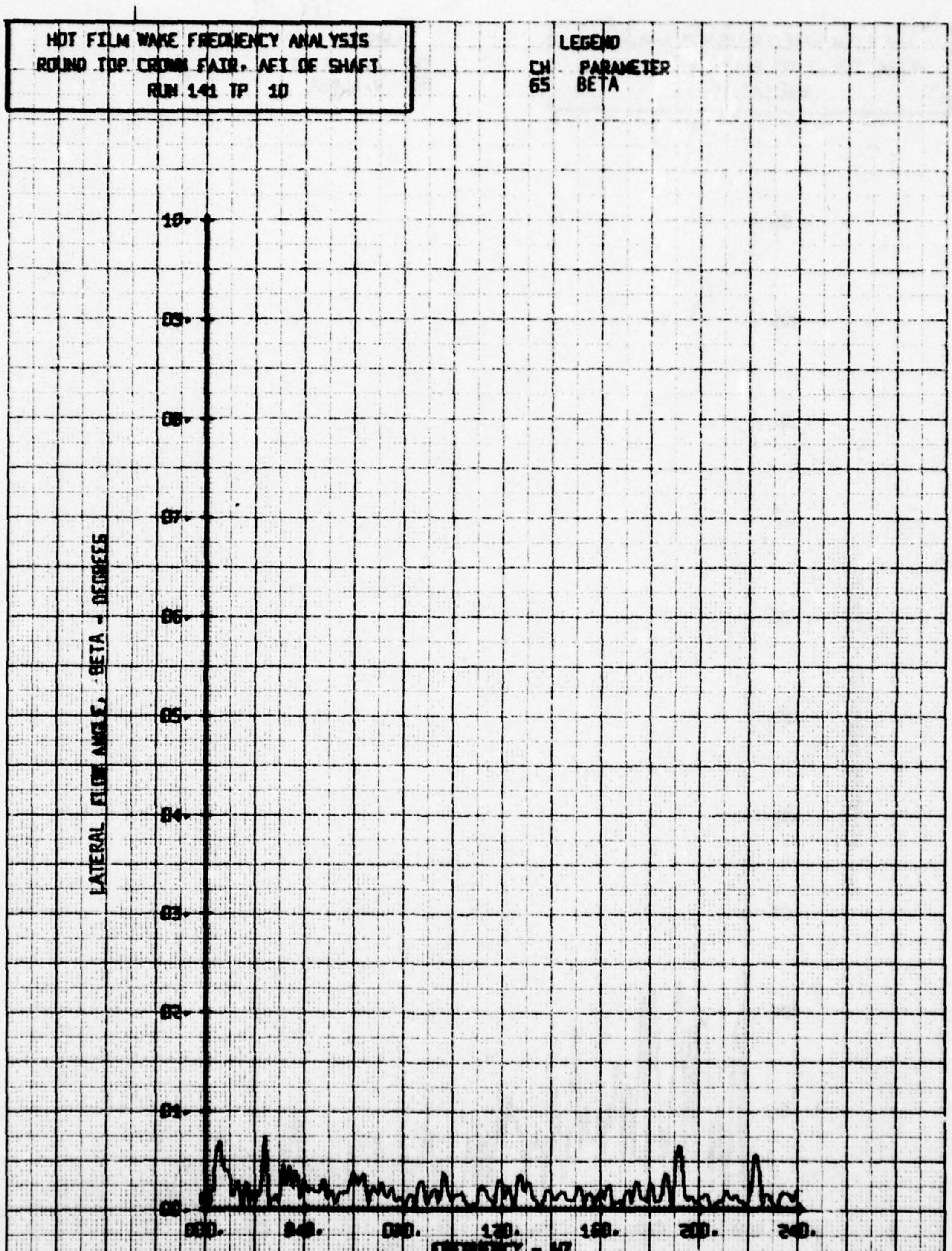
FREQUENCY - HZ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RUN 141 TP 10
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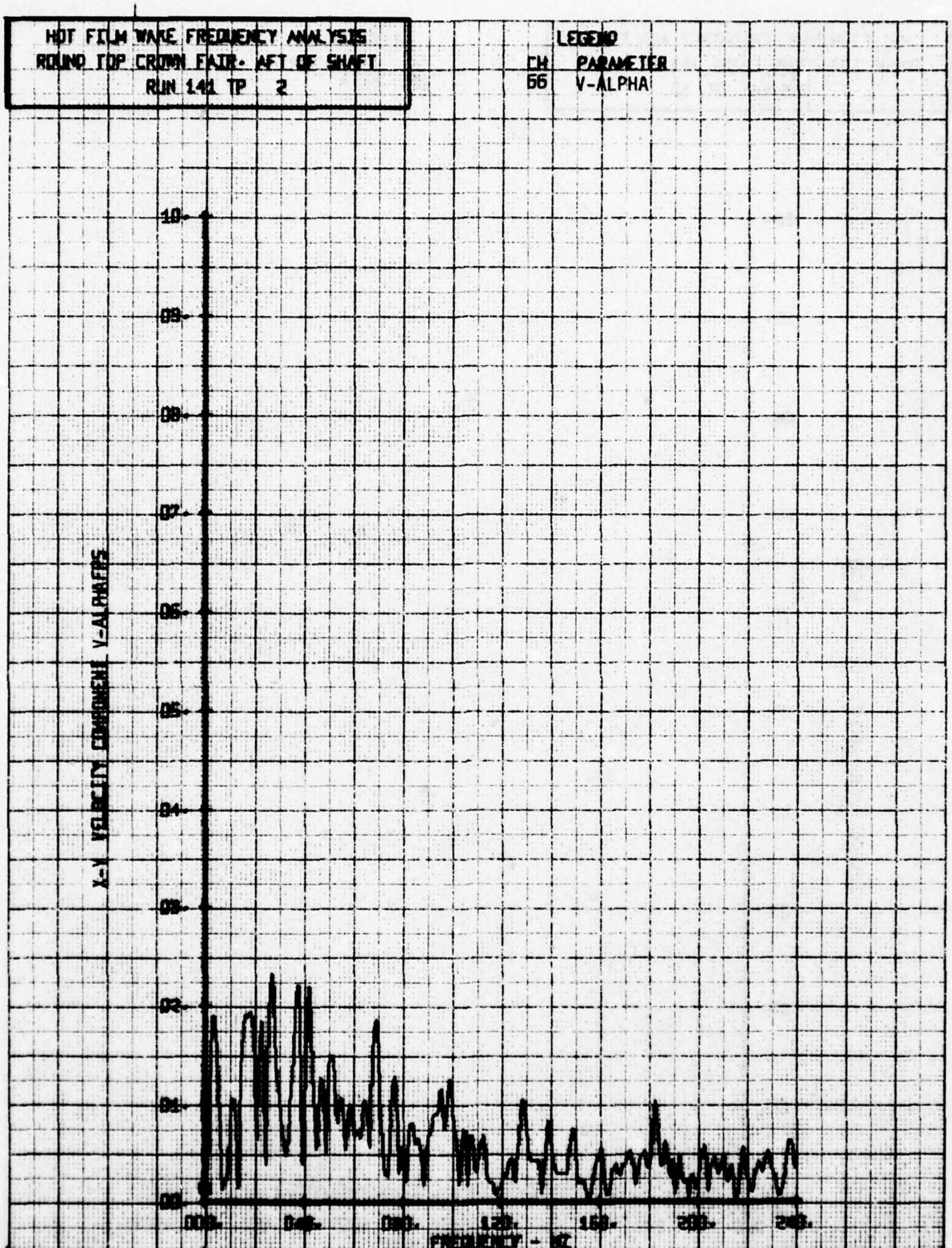
LATERAL FLOW ANGLE, BETA - DEGREES
FREQUENCY - HZ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ROUND TOP CROWN FAIR. AFT OF SHAFT
RUN 141 TP 2
LEGEND
CH PARAMETER
56 V-ALPHA
X-Y VELOCITY COMPONENT V-ALPHAFPS
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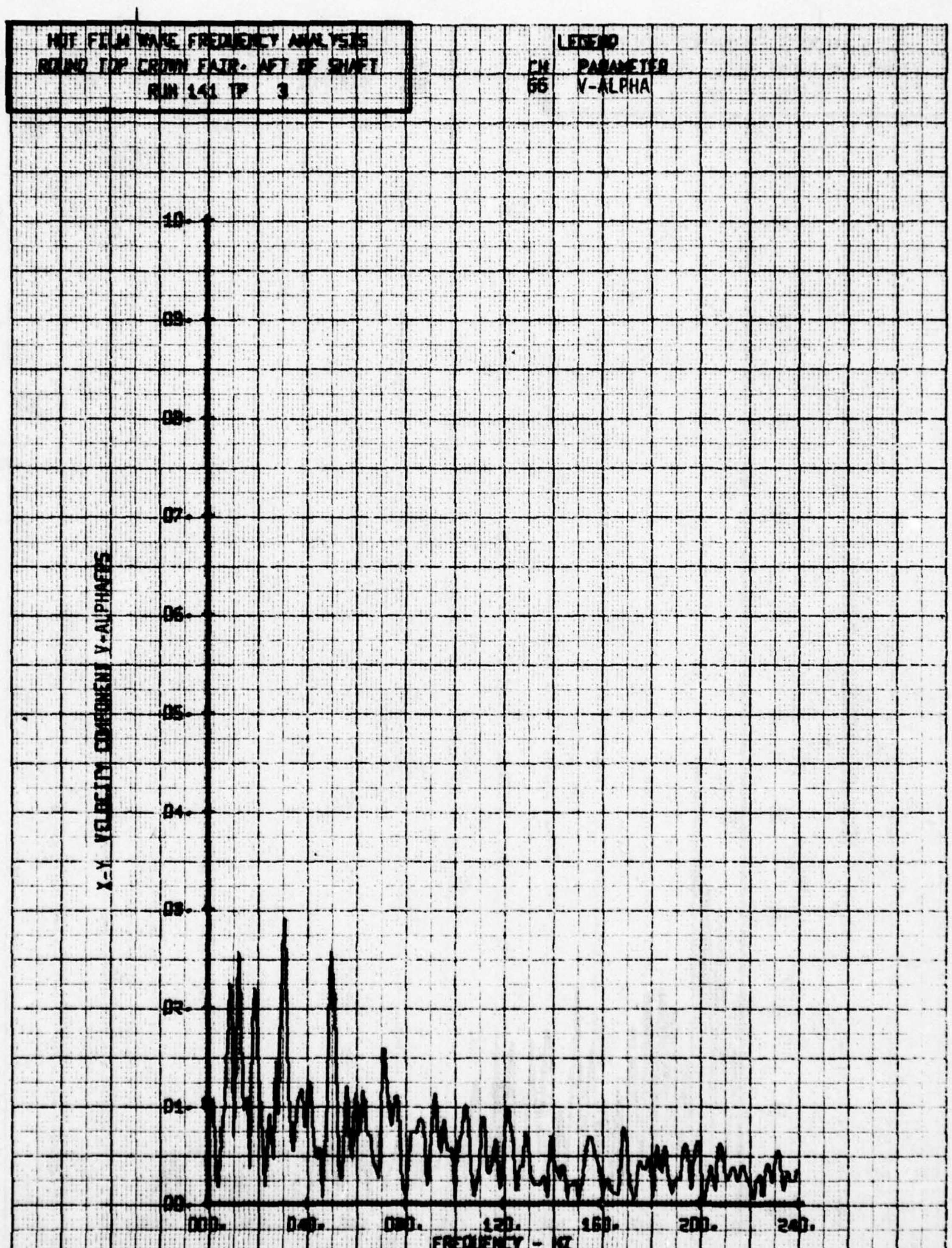
FREQUENCY - HZ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RUN 141 TP 3
LEGEND
CH PARAMETER
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X-Y VELOCITY COMPONENT V-ALPHAFPS
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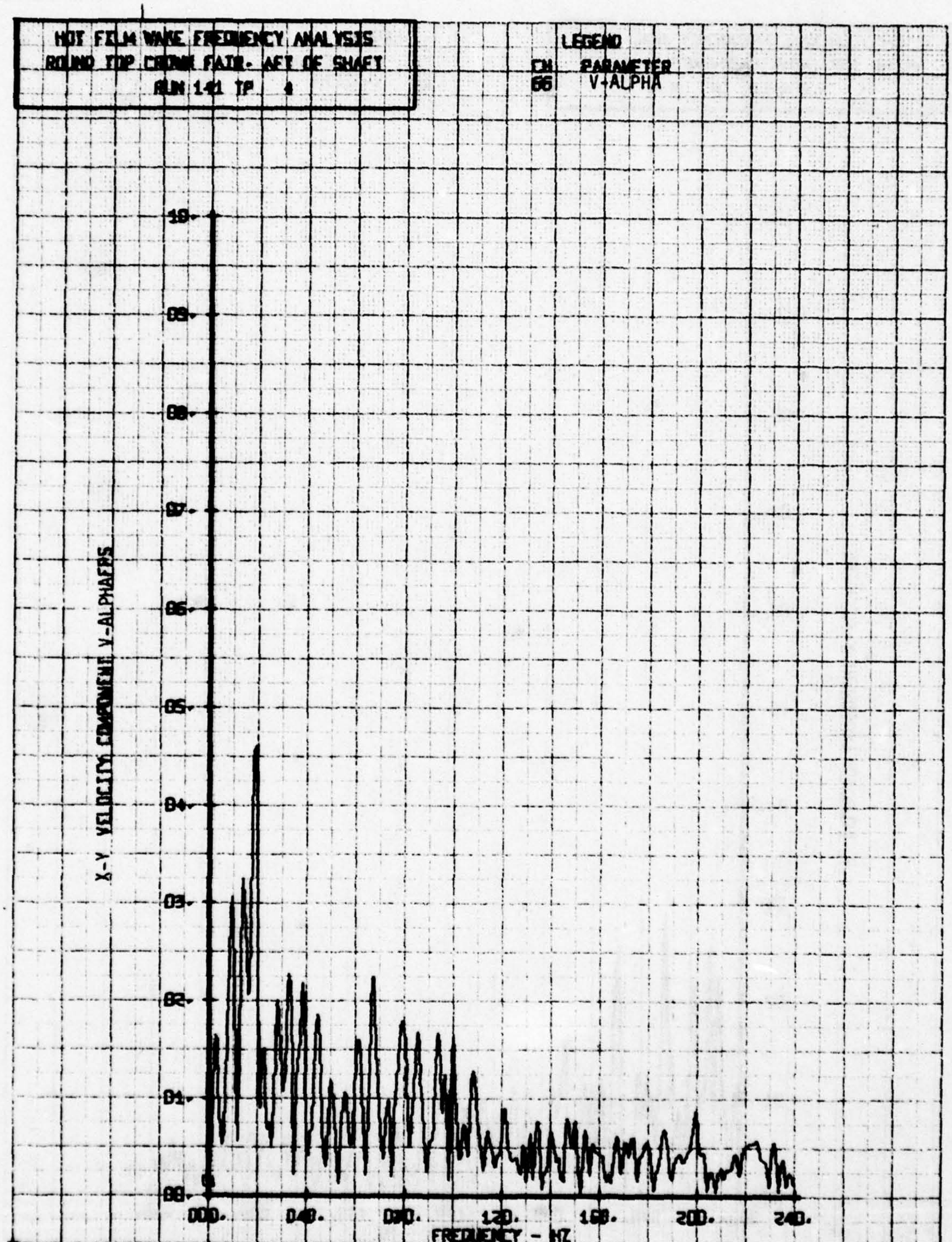
FREQUENCY - HZ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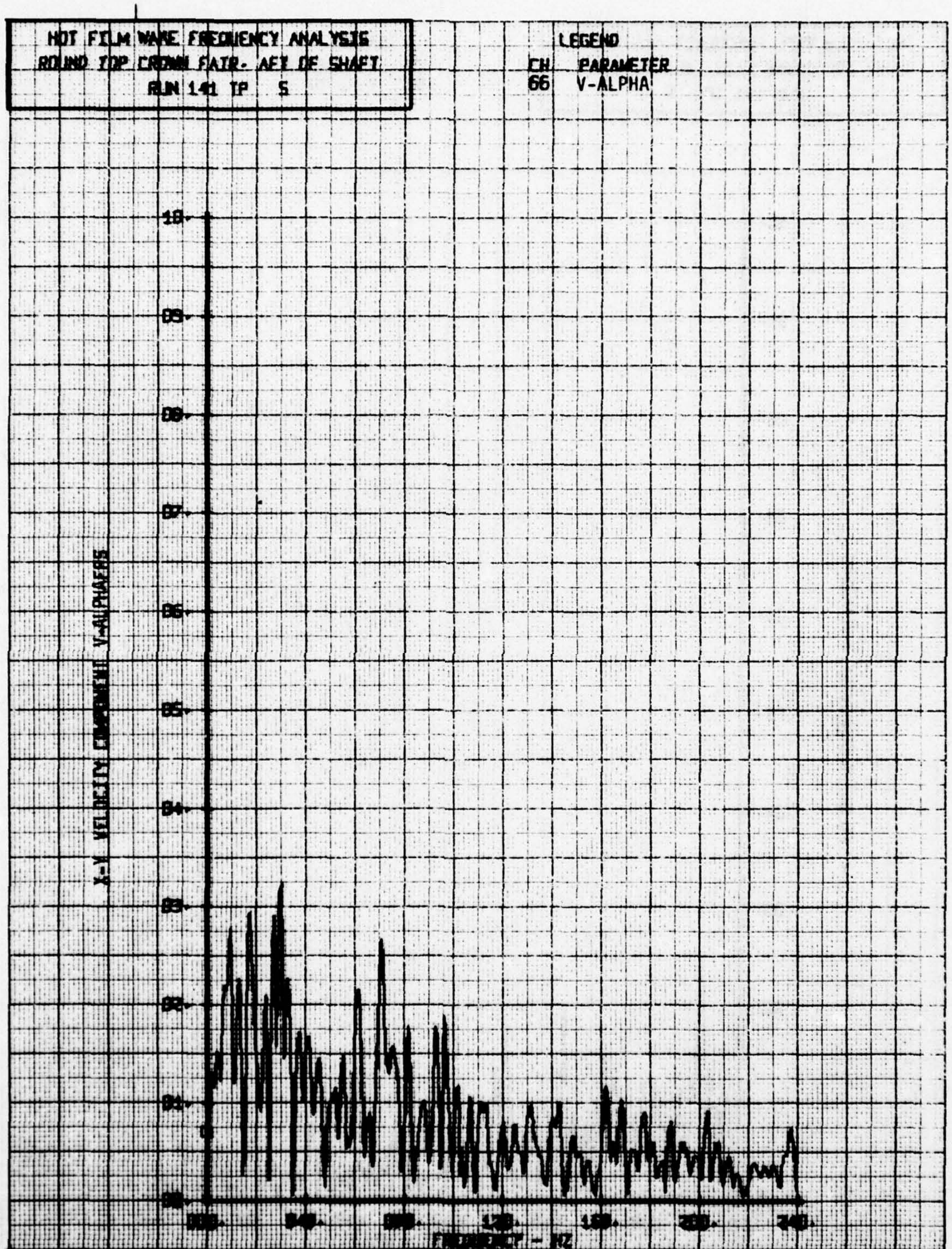
ROUND TOP CROWN FAIR. AFT OF SHAFT
RUN 141 TP 4
LEGEND
CH PARAMETER
66 V-ALPHA
X-Y VELOCITY COMPONENT V-ALPHAFPS
FREQUENCY - HZ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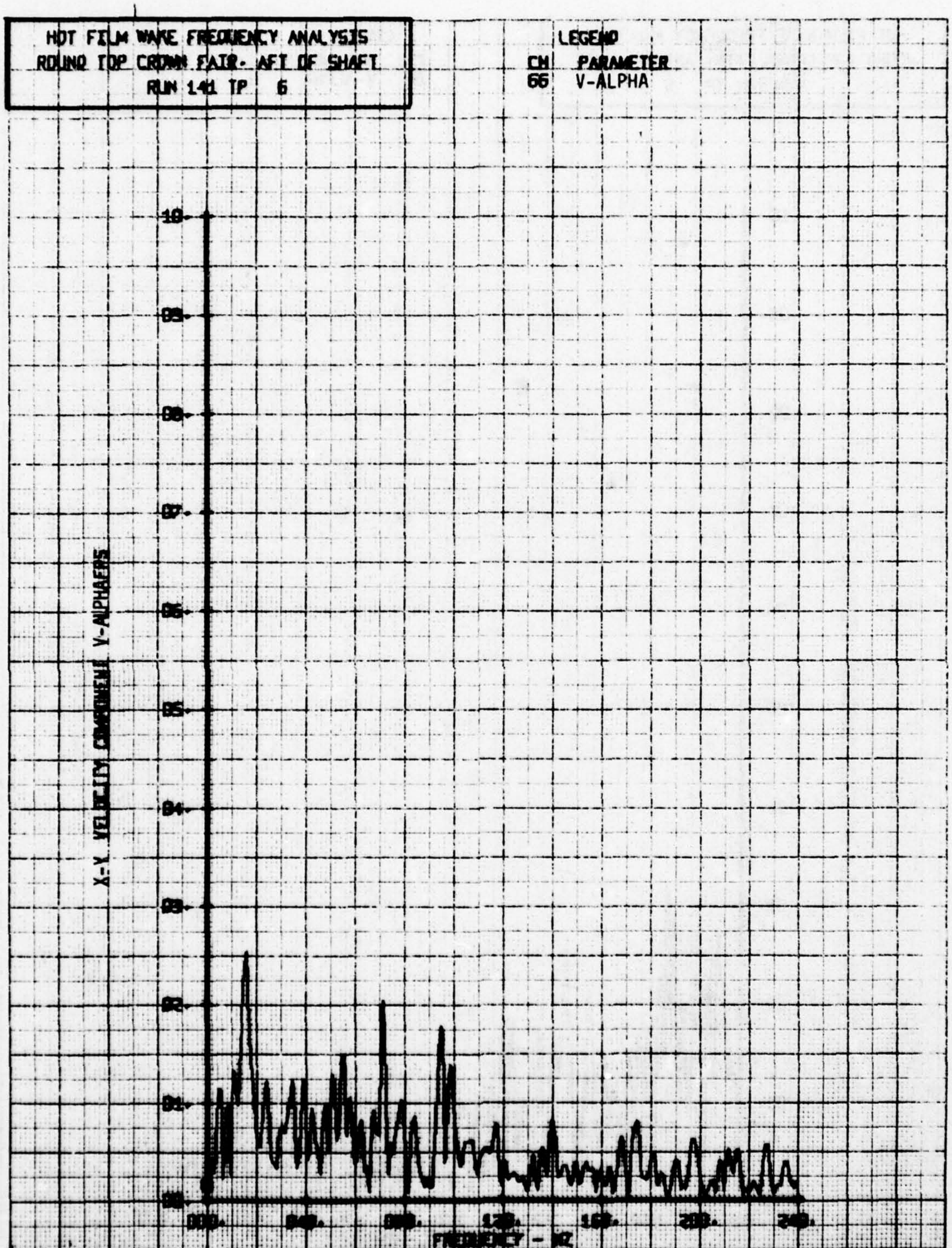
RUN 141 TP 5
LEGEND
CH PARAMETER
66 V-ALPHA
FREQUENCY - HZ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RUN 141 TP 6
LEGEND
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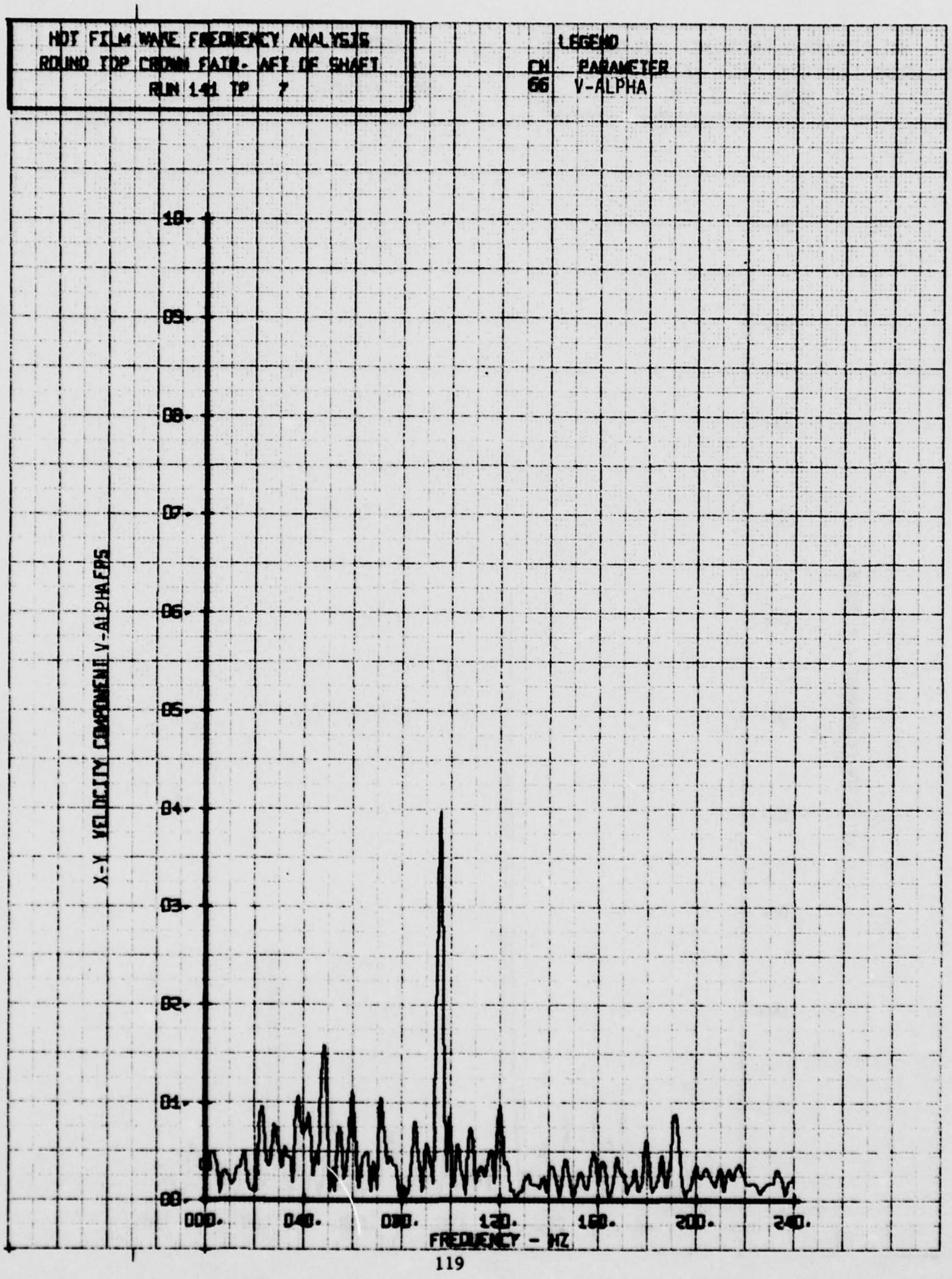
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RUN 141 TP 7
LEGEND
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X-Y VELOCITY COMPONENT V-ALPHA FPS
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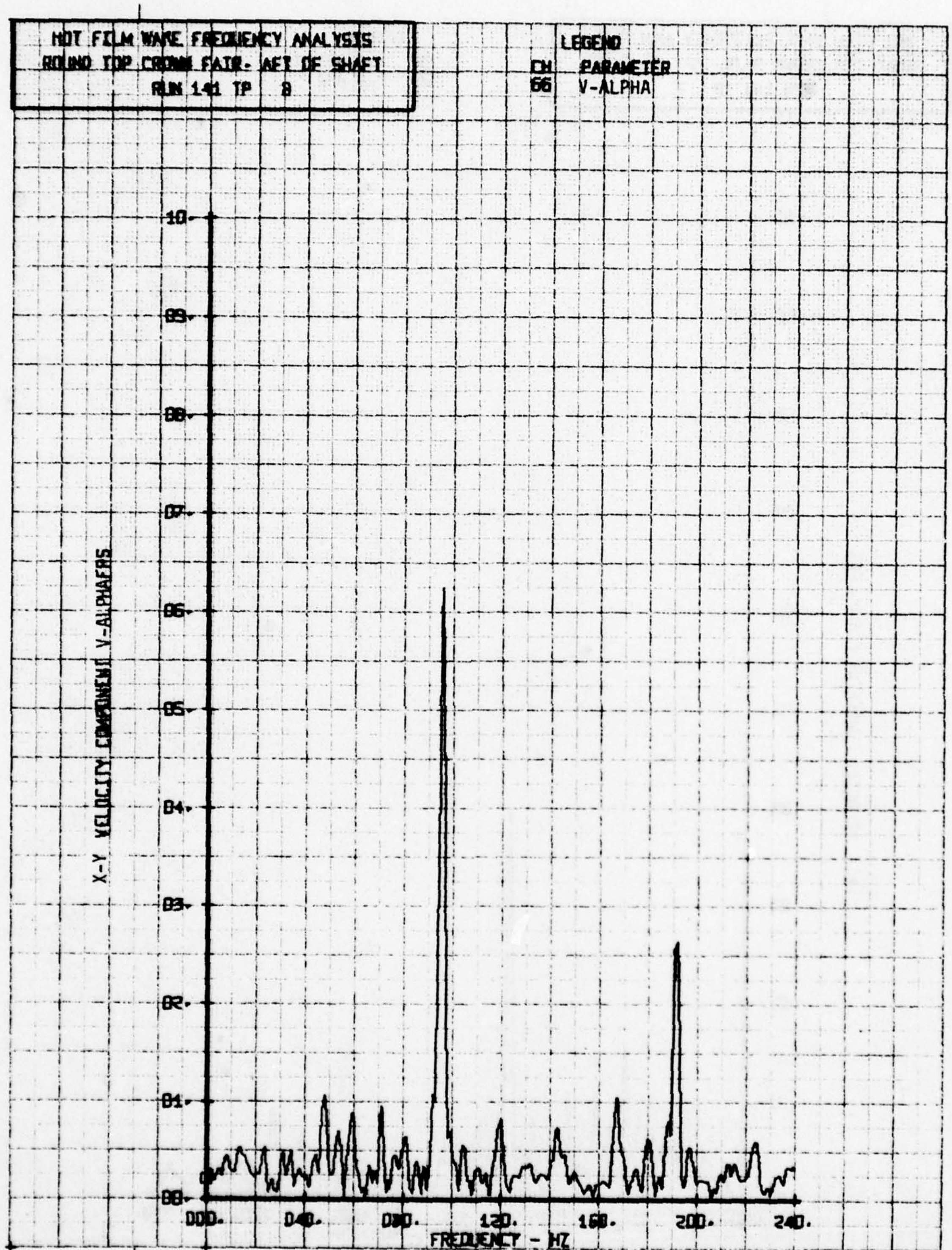
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LEGEND
CH PARAMETER
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X-Y VELOCITY COMPONENT V-ALPHAFRS
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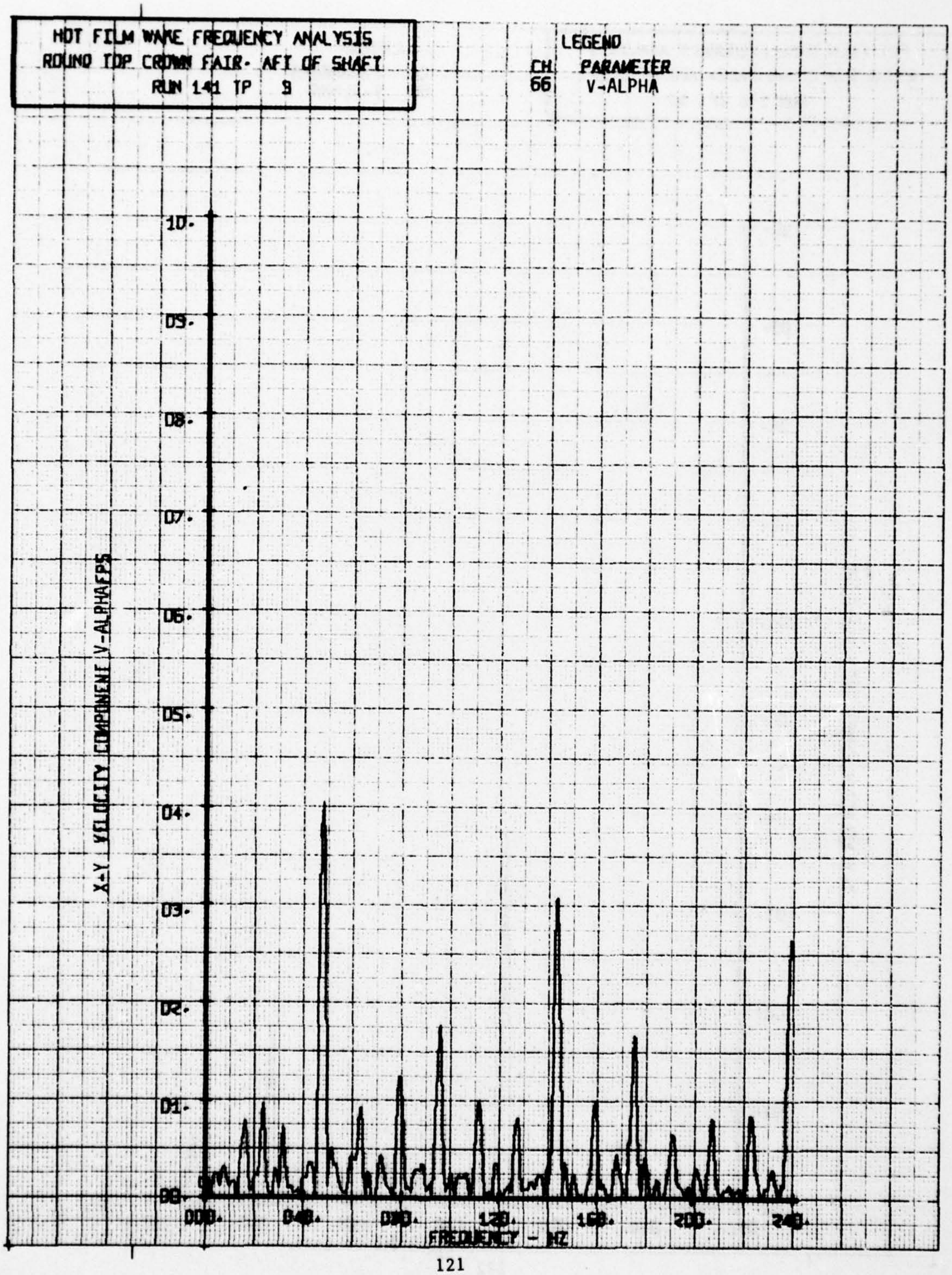
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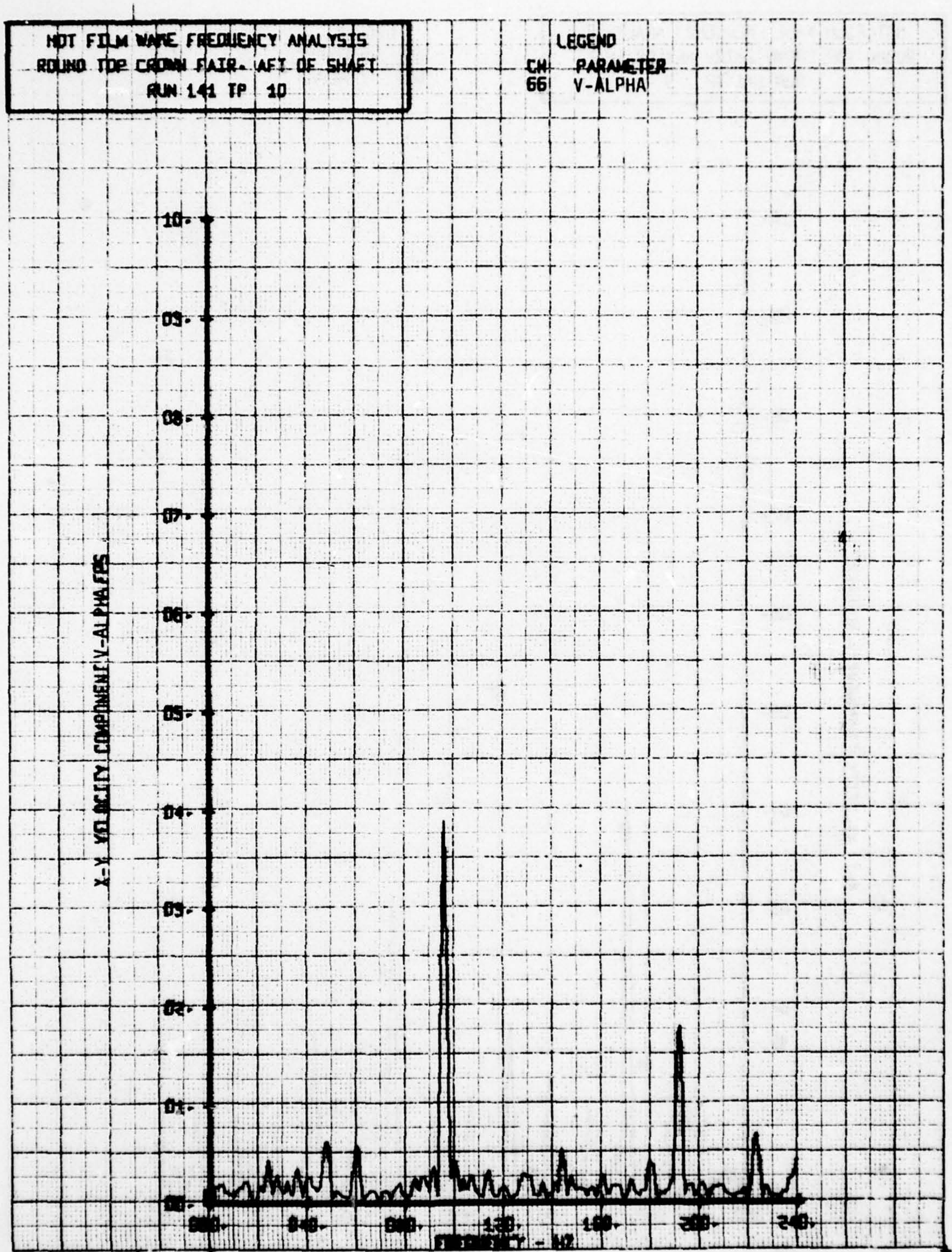
ROUND TOP CROWN FAIR- AFT OF SHAFT
RUN 141 TP 9
LEGEND
CH PARAMETER
66 V-ALPHA
X-Y VELOCITY COMPONENT V-ALPHAFPS
FREQUENCY - HZ


HOT FILM WAKE FREQUENCY ANALYSIS
ROUND TOP CROWN FAIR. AFT OF SHAFT
RUN 141 TP 10
LEGEND
CH PARAMETER
66 V-ALPHA
X-Y VELOCITY COMPONENT V-ALPHA,FPS
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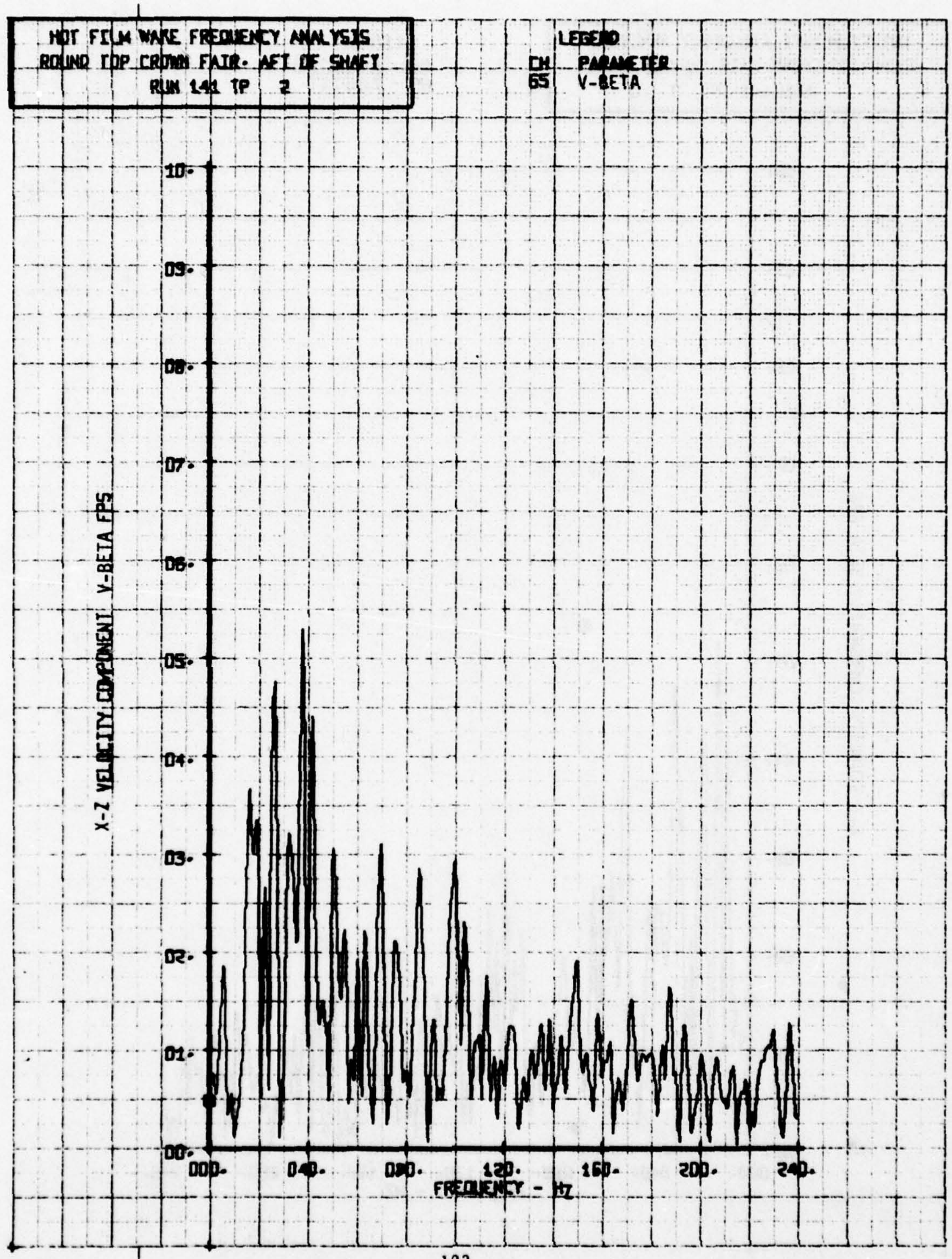
240.



HOT FILM WAKE FREQUENCY ANALYSIS
ROUND TOP CROWN FAIR. AFT OF SHAFT
RUN 141 TP 2
LEGEND
CH PARAMETER
65 V-BETA
X-Z VELOCITY COMPONENT V-BETA FPS
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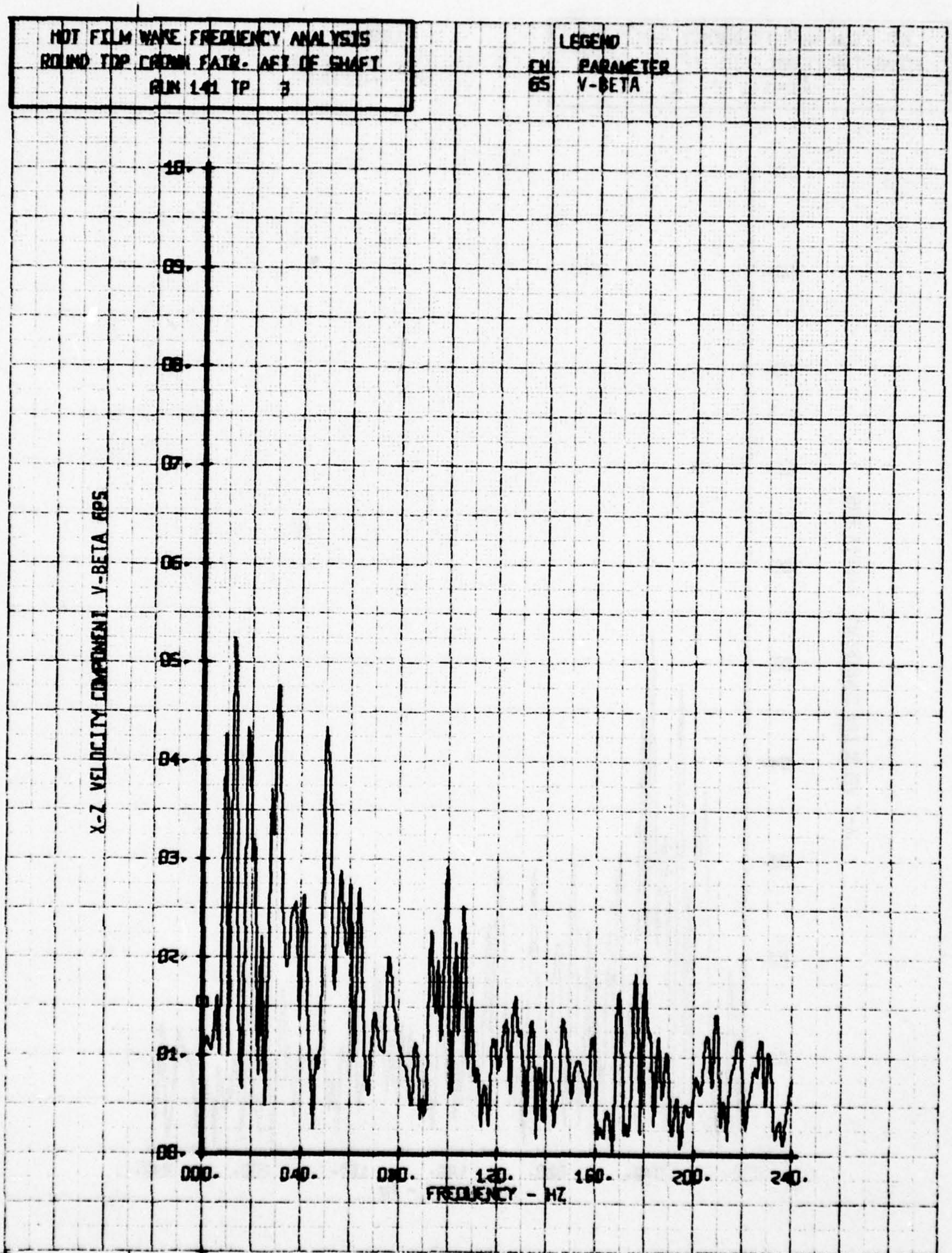
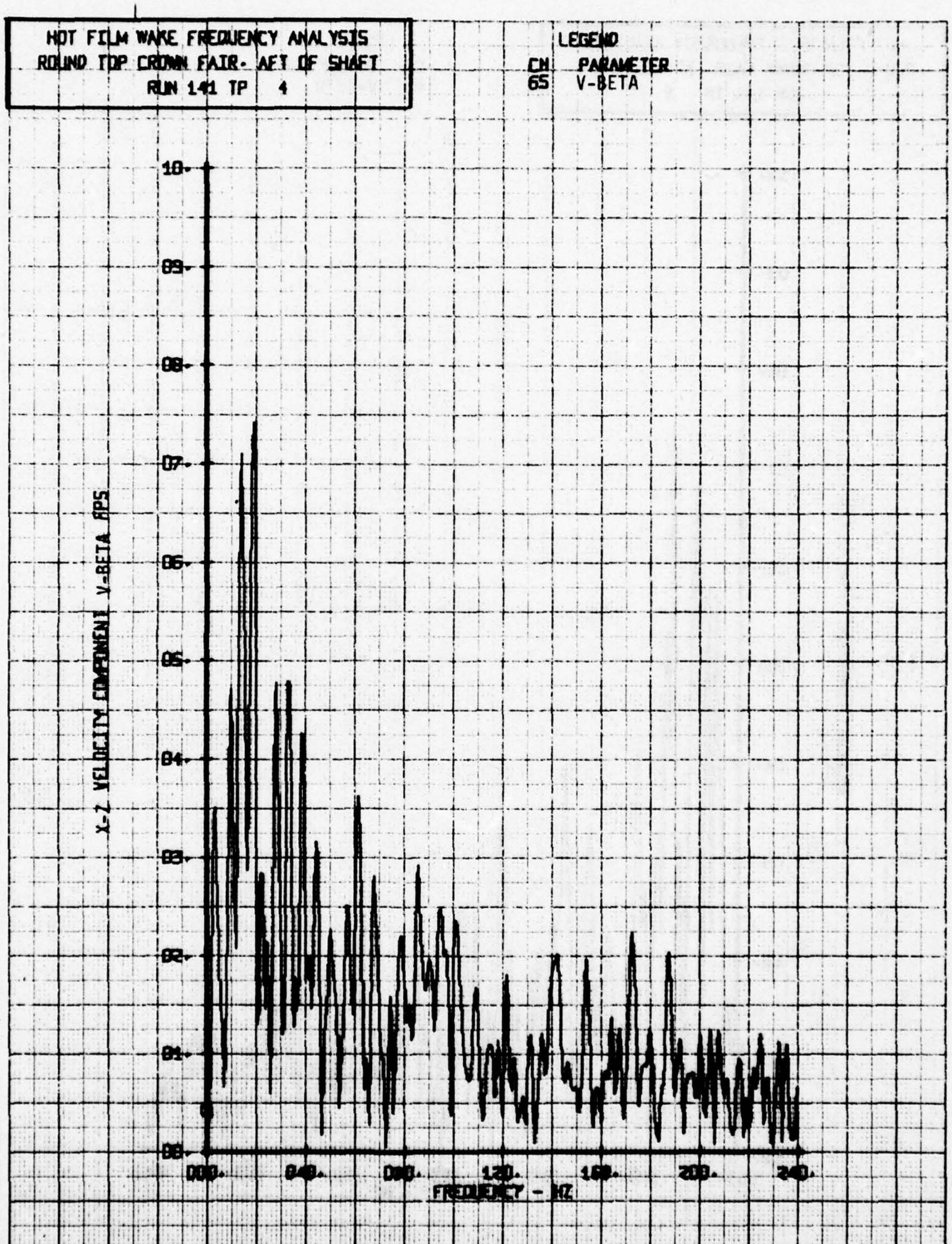
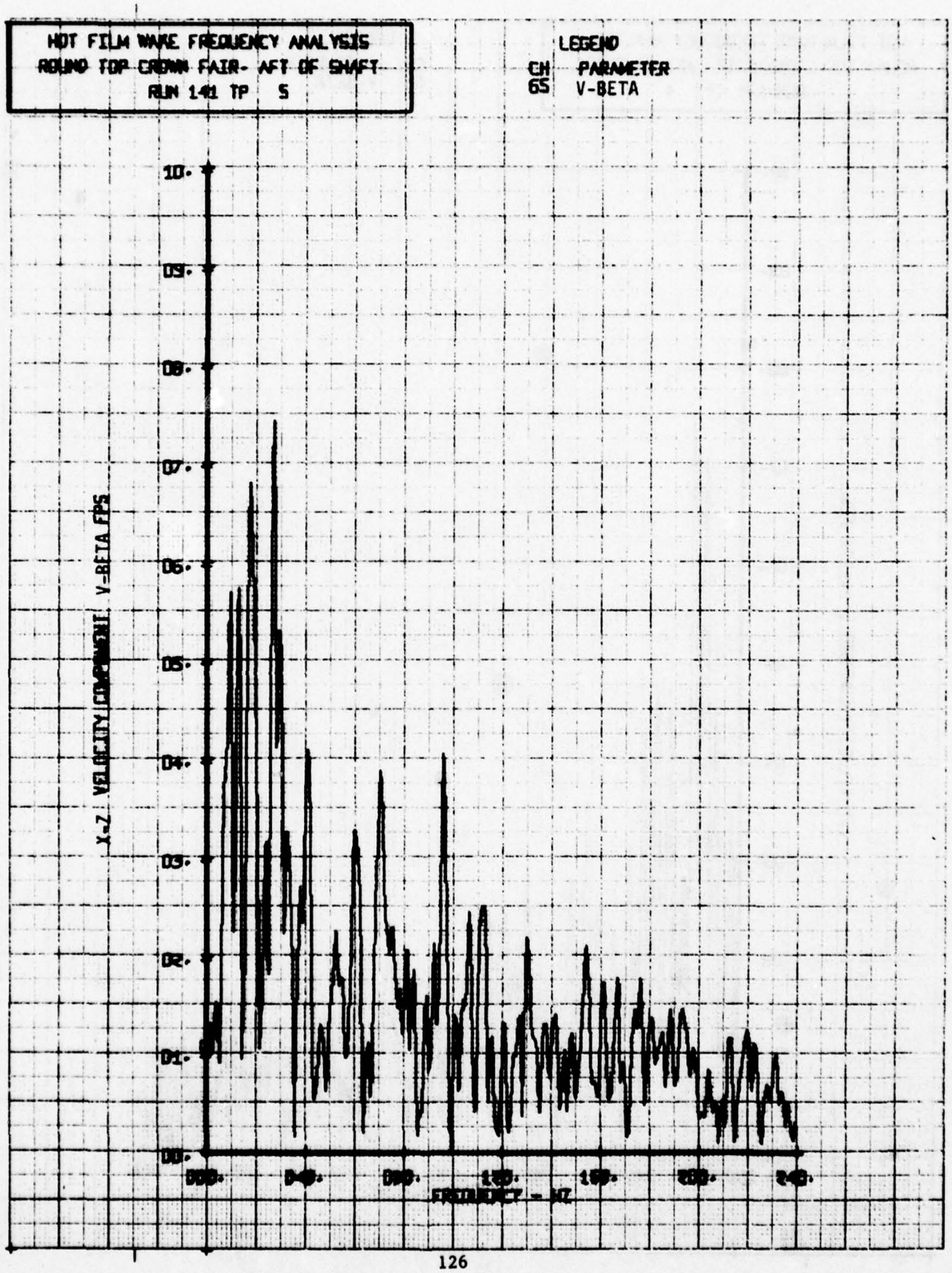
FREQUENCY - Hz

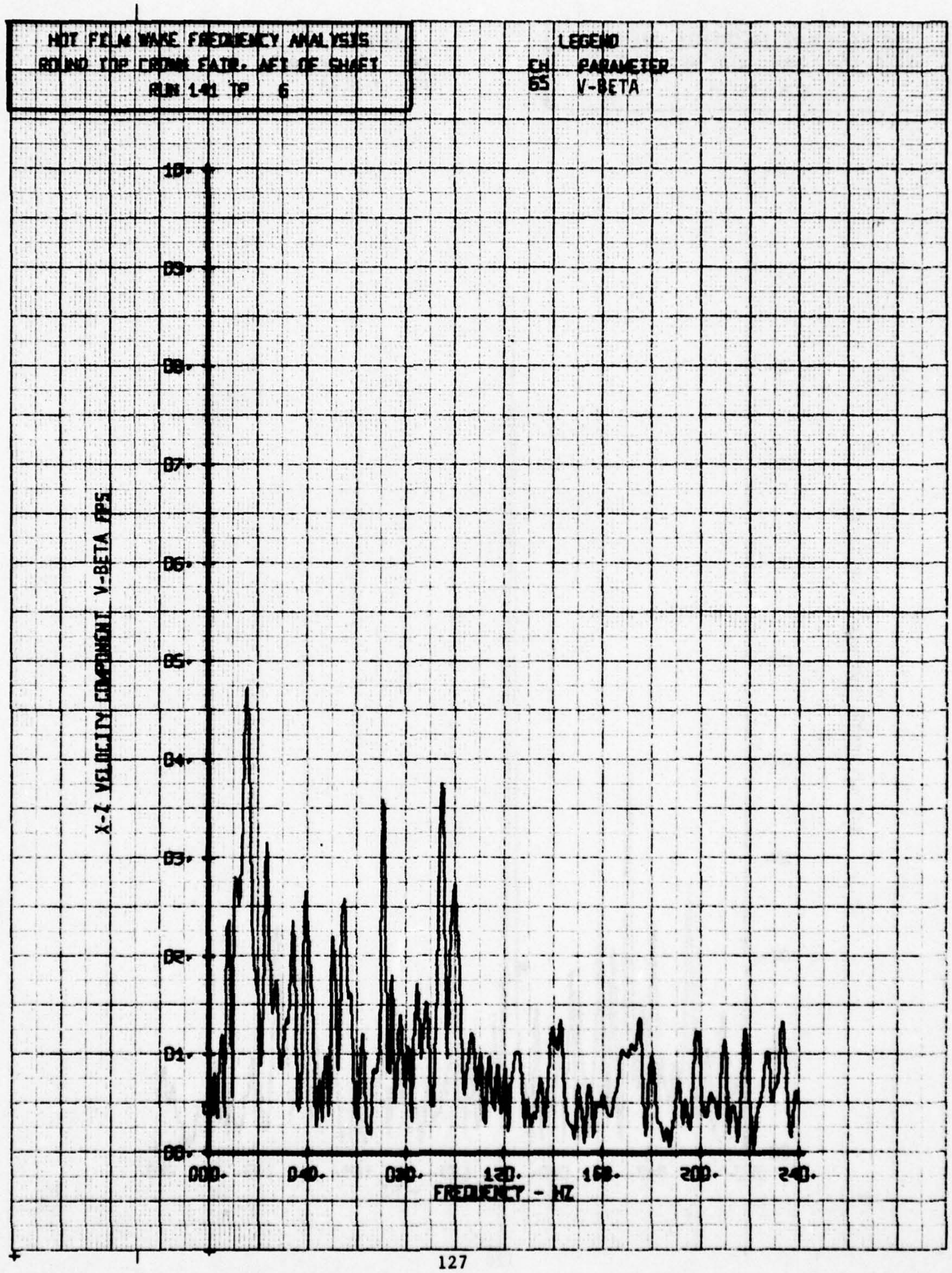

HOT FILM WAKE FREQUENCY ANALYSIS
ROUND TOP CROWN FAIR. AFT OF SHAFT
RUN 141 TP 3
LEGEND
CH PARAMETER
65 V-BETA
X-Z VELOCITY COMPONENT V-BETA 65
FREQUENCY - HZ

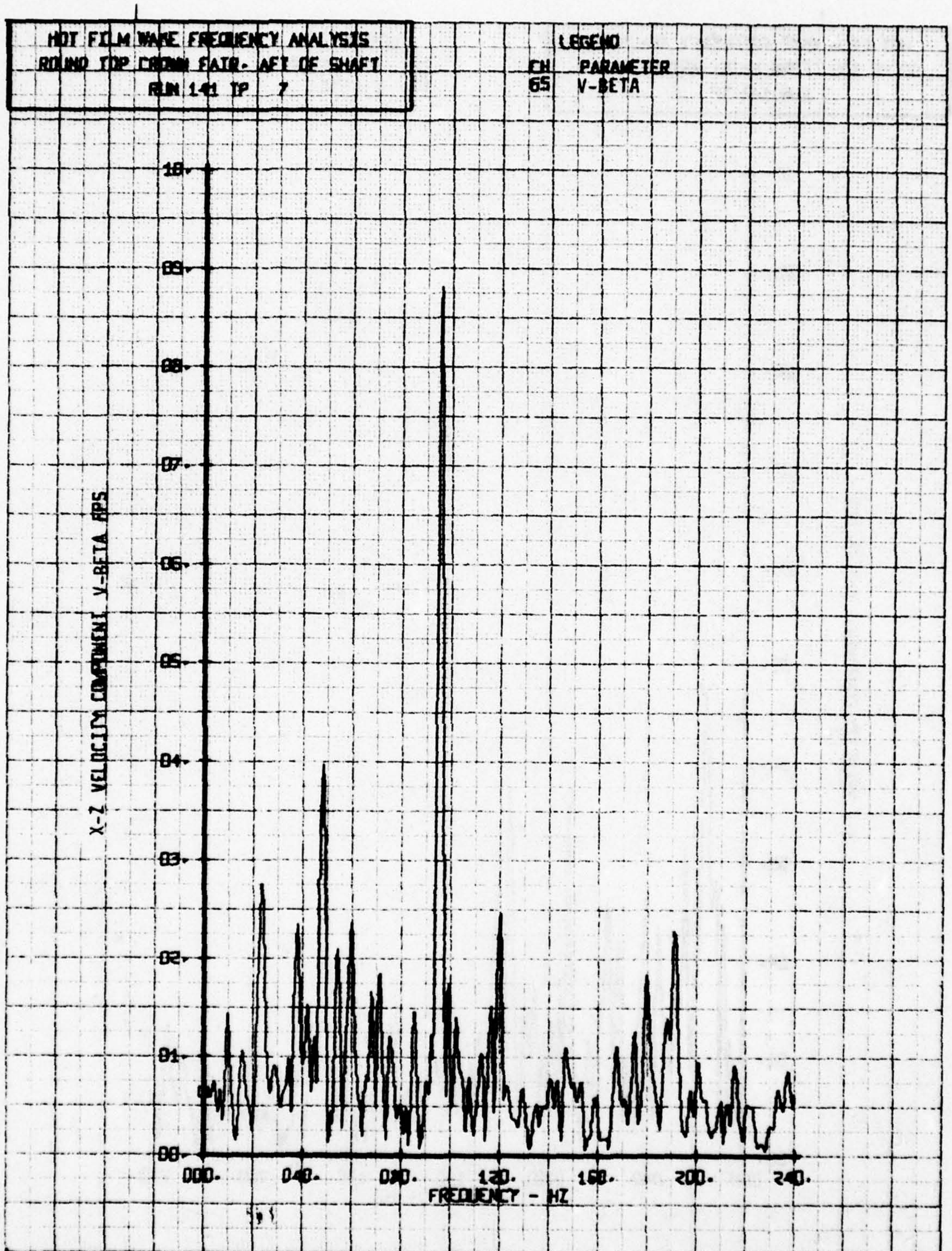


HOT FILM WAKE FREQUENCY ANALYSIS
ROUND TOP CROWN FAIR. AFT OF SHAFT
RUN 141 TP 4
LEGEND
CH PARAMETER
65 V-BETA
X-Z VELOCITY COMPONENT V-BETA FPS
FREQUENCY - HZ



HOT FILM WAKE FREQUENCY ANALYSIS
ROUND TOP CROWN FAIR- AFT OF SHAFT
RUN 141 TP 5
LEGEND
CH PARAMETER
65 V-BETA
X-Z VELOCITY COMPONENT V-BETA FPS
FREQUENCY - HZ


HOT FILM WAKE FREQUENCY ANALYSIS
ROUND TOP CROWN FATR. AFT OF SHAFT
RUN 141 TP 6
LEGEND
CH PARAMETER
65 V-BETA
X-Z VELOCITY COMPONENT V-BETA FPS
FREQUENCY - HZ



HOT FILM WAKE FREQUENCY ANALYSIS
ROUND TOP CROWN FAIR. AFT OF SHAFT
RUN 141 TP 7
LEGEND
CH PARAMETER
65 V-BETA
X-Z VELOCITY COMPONENT V-BETA RPS
FREQUENCY - HZ
000. 040. 080. 120. 160. 200. 240.
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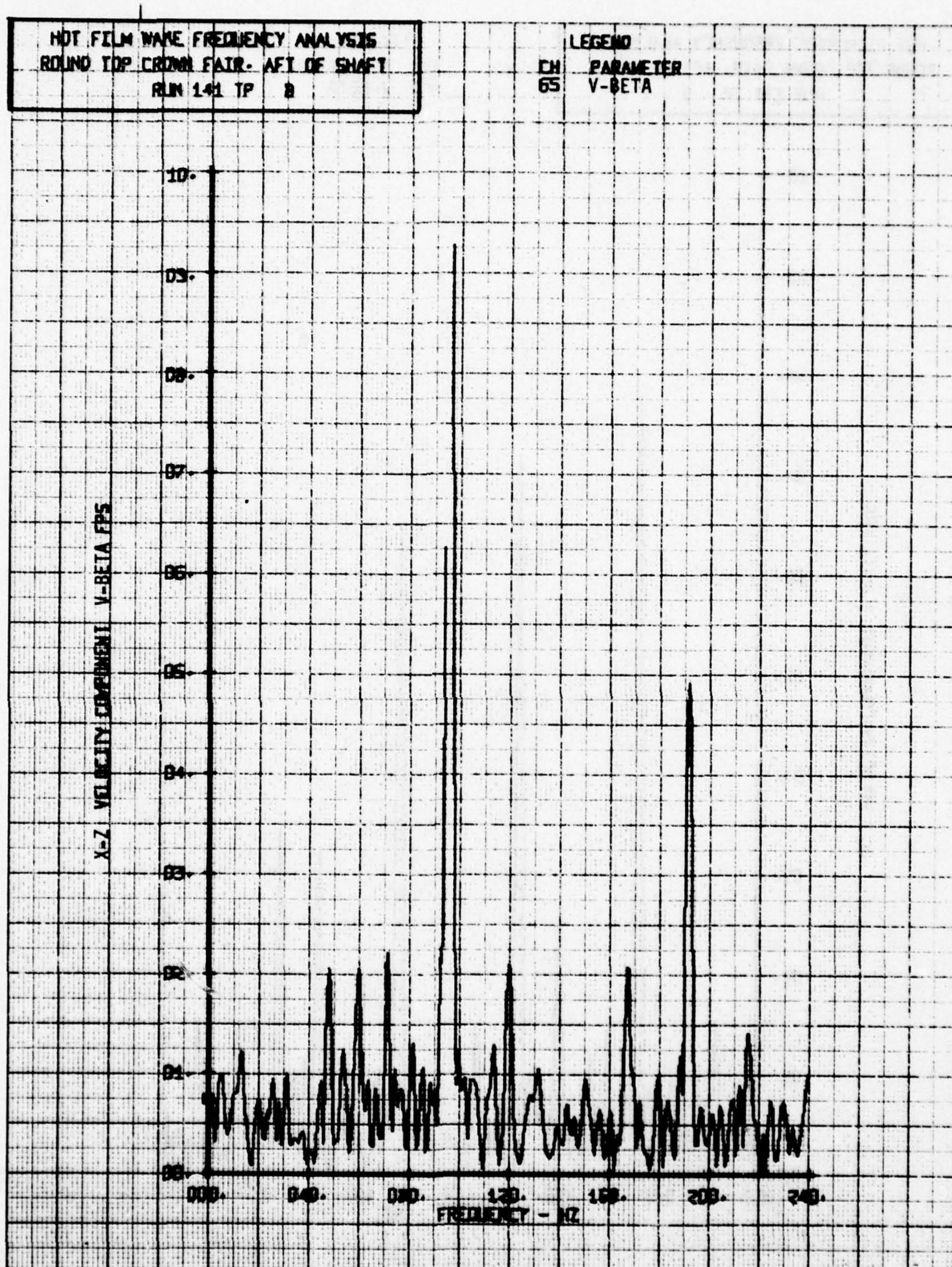
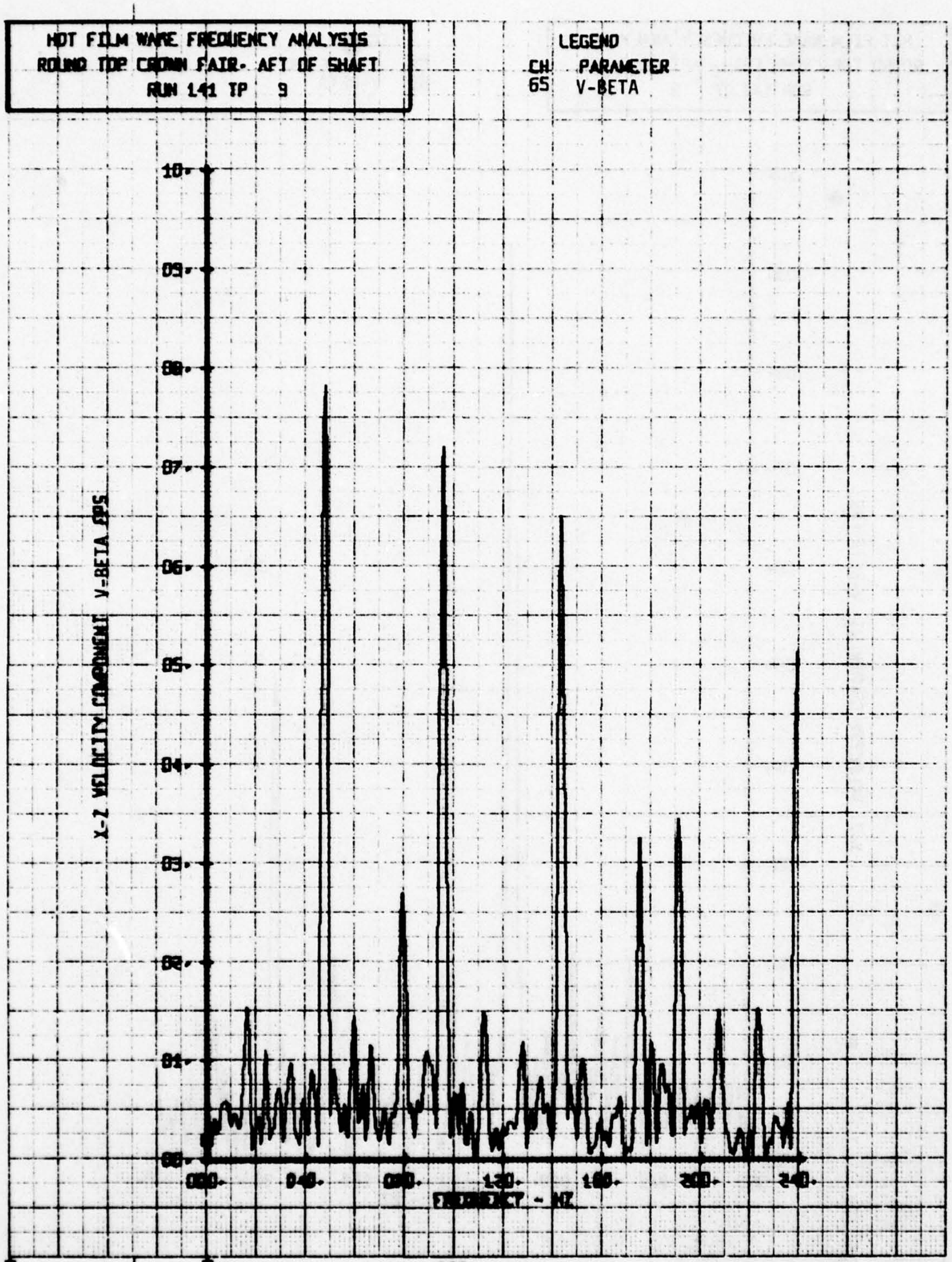
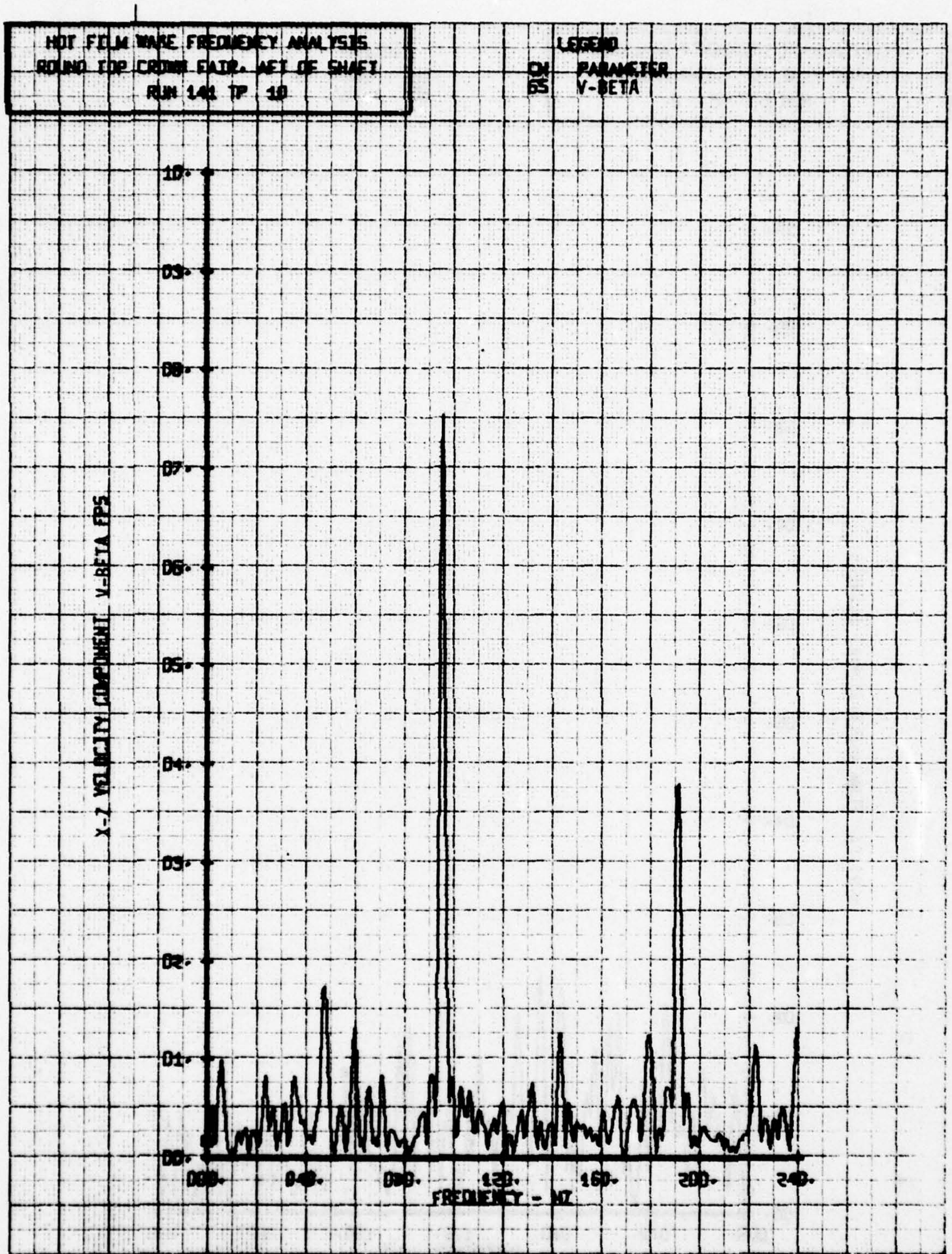
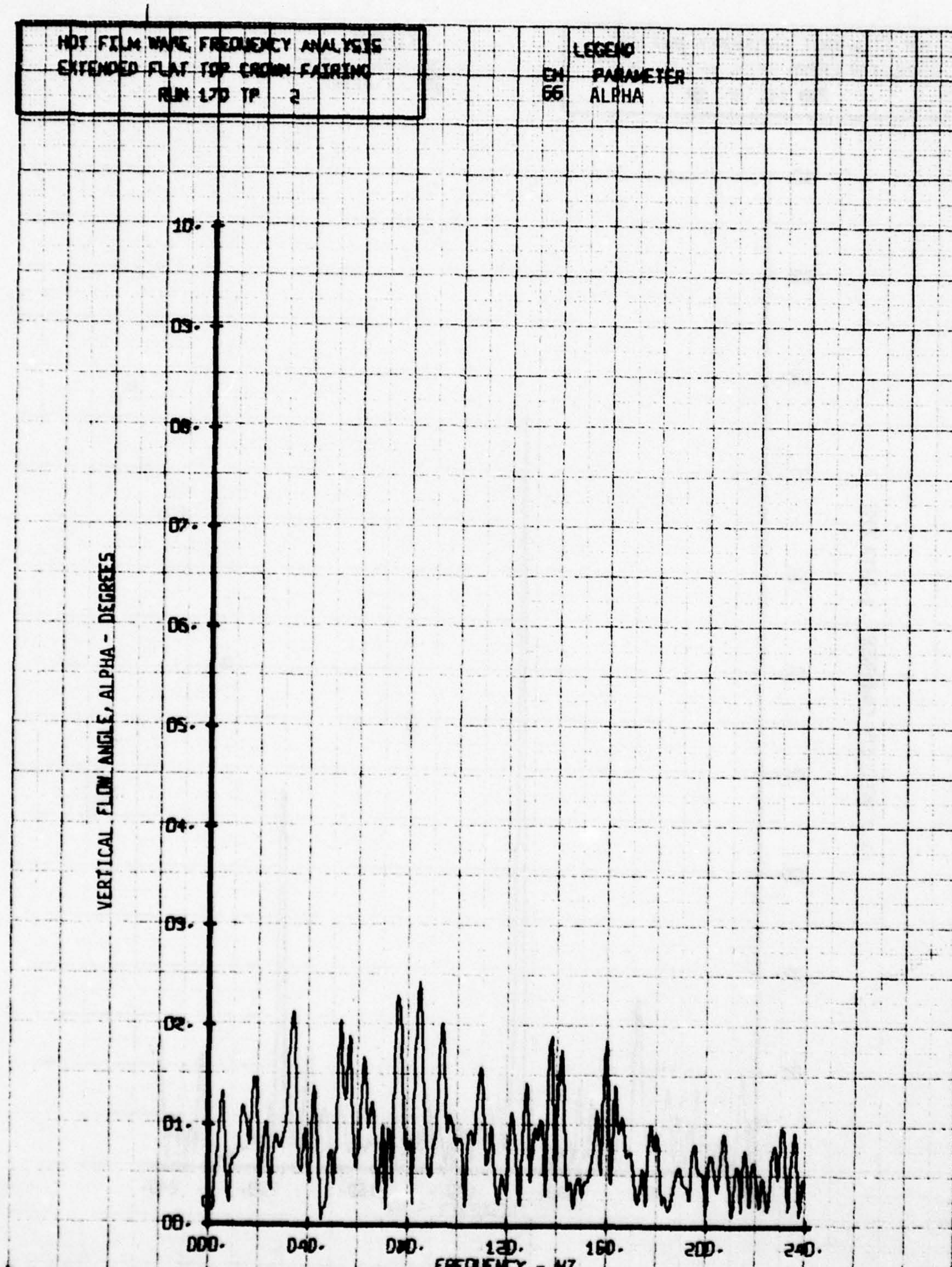

HOT FILM WAKE FREQUENCY ANALYSIS
ROUND TOP CROWN FAIR. AFT OF SHAFT
RUN 141 TP 8
LEGEND
CH PARAMETER
65 V-BETA
X-Z VELOCITY COMPONENT V-BETA FPS
FREQUENCY - HZ


HOT FILM WAKE FREQUENCY ANALYSIS
ROUND TOP CROWN FAIR. AFT OF SHAFT
RUN 141 TP 9
LEGEND
CH PARAMETER
65 V-BETA
X-Z VELOCITY COMPONENT V-BETA FPS
FREQUENCY - HZ



HOT FILM WAKE FREQUENCY ANALYSIS
ROUND TOP CROWN FAIR. AFT OF SHAFT
RUN 141 TP 10
LEGEND
CH PARAMETER
65 V-BETA
X-Z VELOCITY COMPONENT V-BETA FPS
FREQUENCY - HZ


HOT FILM WAKE FREQUENCY ANALYSIS
EXTENDED FLAT TOP CROWN FAIRING
RUN 170 TP 2
LEGEND
CH PARAMETER
66 ALPHA
VERTICAL FLOW ANGLE, ALPHA - DEGREES
FREQUENCY - HZ
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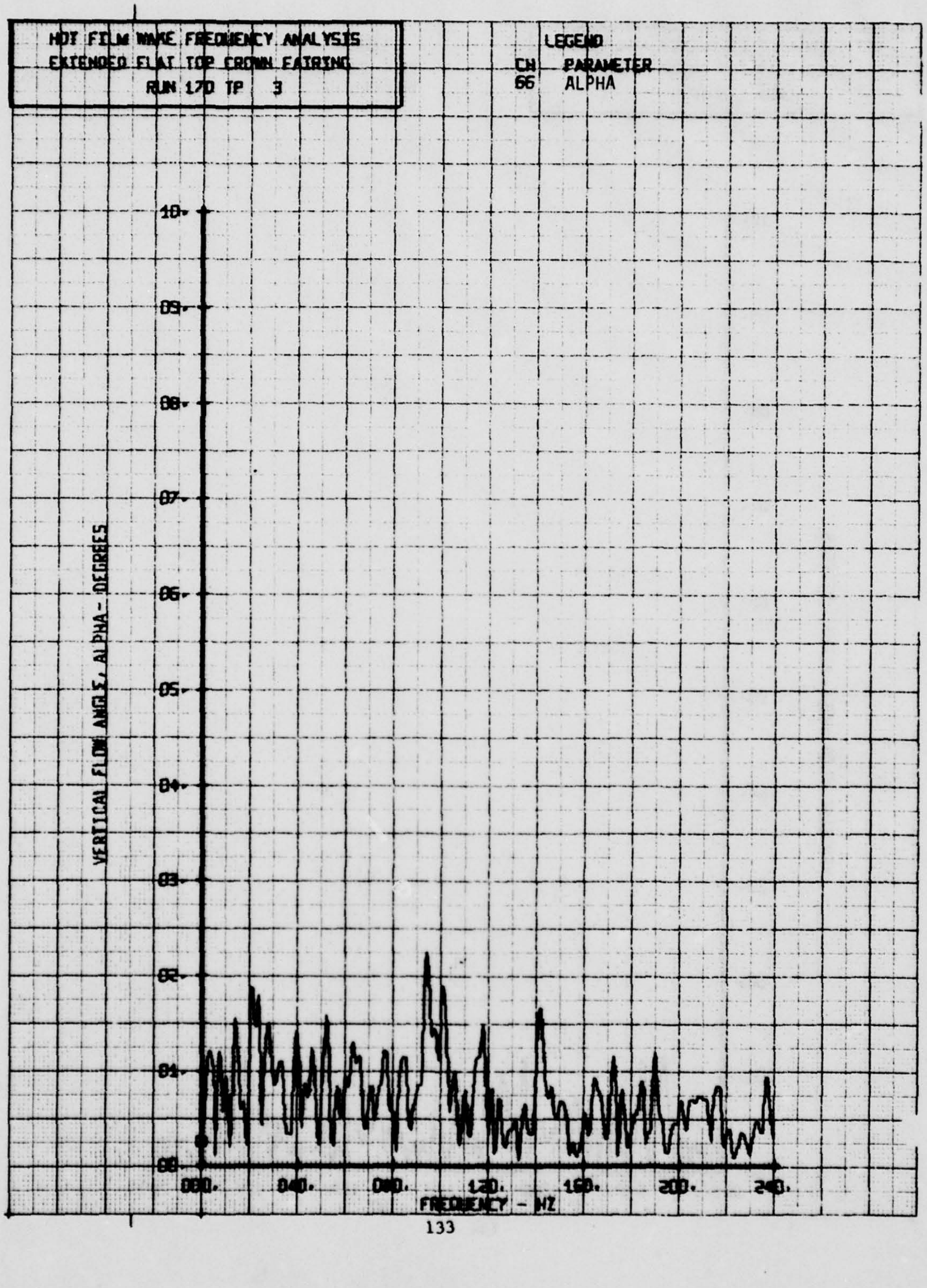
HOT FILM WAKE FREQUENCY ANALYSIS
EXTENDED FLAT TOP CROWN FAIRING
RUN 170 TP 3
LEGEND
CH PARAMETER
66 ALPHA
VERTICAL FLOW ANGLE, ALPHA - DEGREES
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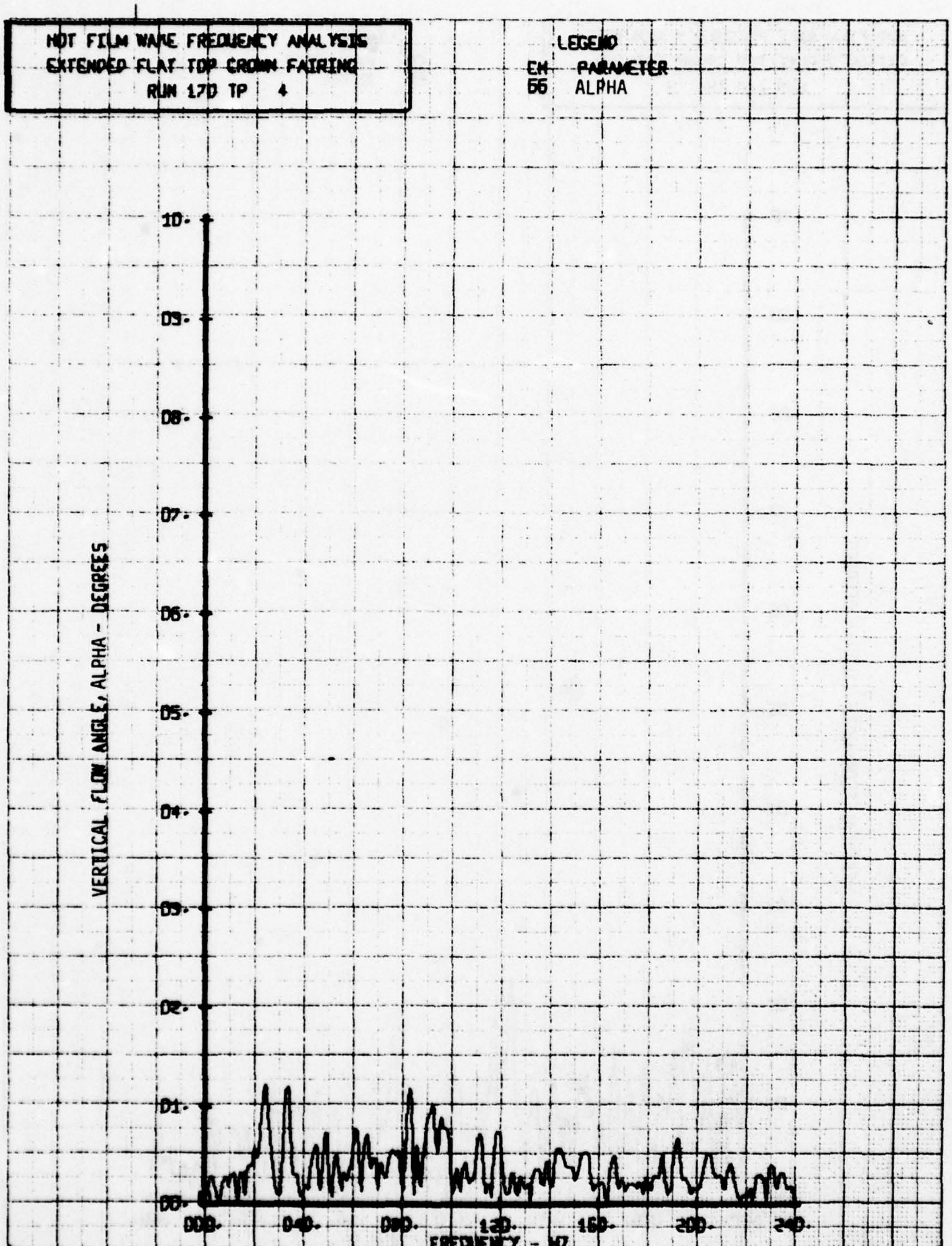
FREQUENCY - HZ


HOT FILM WAKE FREQUENCY ANALYSIS
EXTENDED FLAT TOP CROWN FAIRING
RUN 170 TP 4
LEGEND
EM PARAMETER
55 ALPHA
VERTICAL FLOW ANGLE, ALPHA - DEGREES
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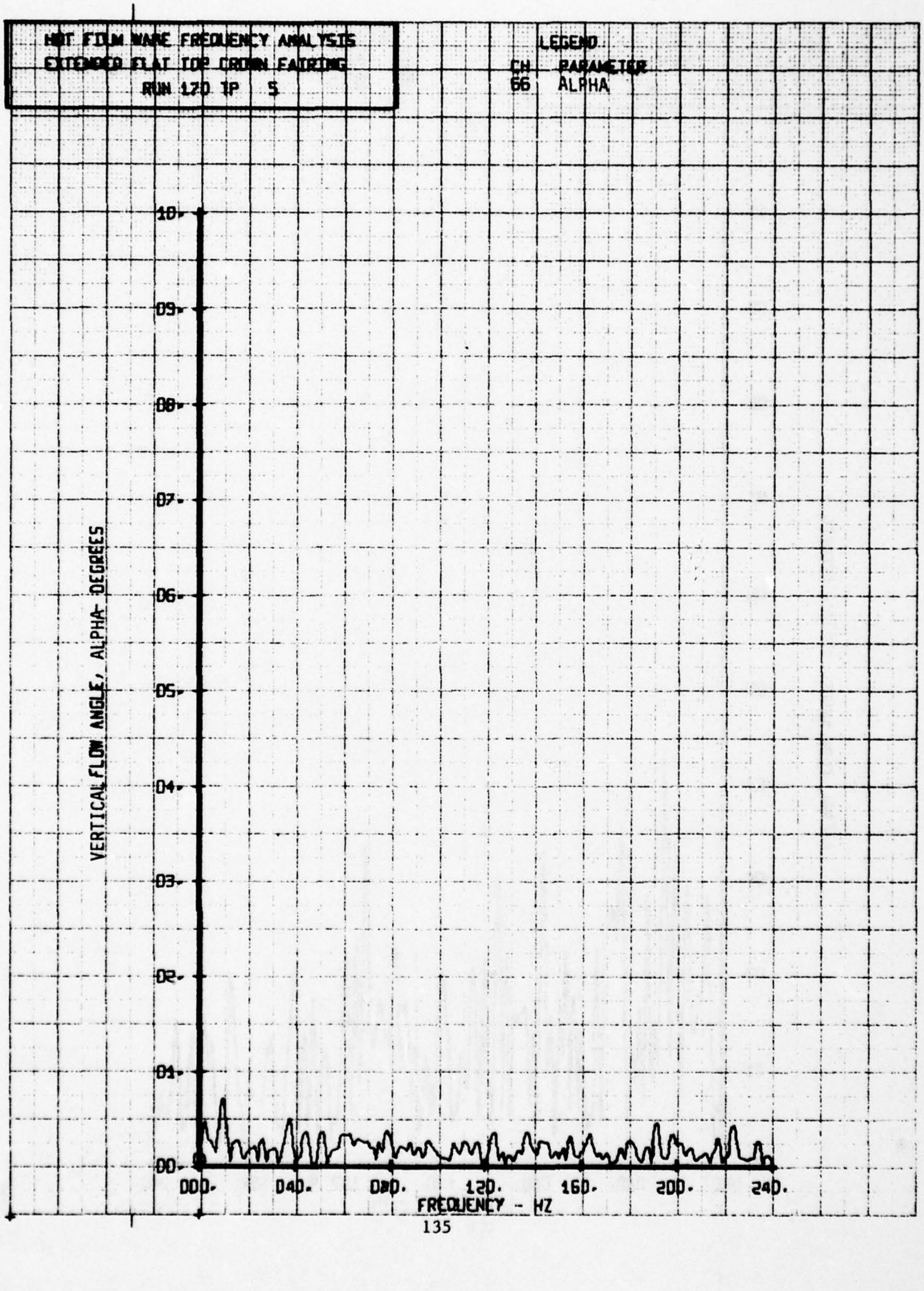
FREQUENCY - HZ


HOT FILM WAKE FREQUENCY ANALYSIS
EXTENDED FLAT TOP CROWN FAIRING
RUN 120 TP 5
LEGEND
CH PARAMETER
66 ALPHA
VERTICAL FLOW ANGLE, ALPHA- DEGREES
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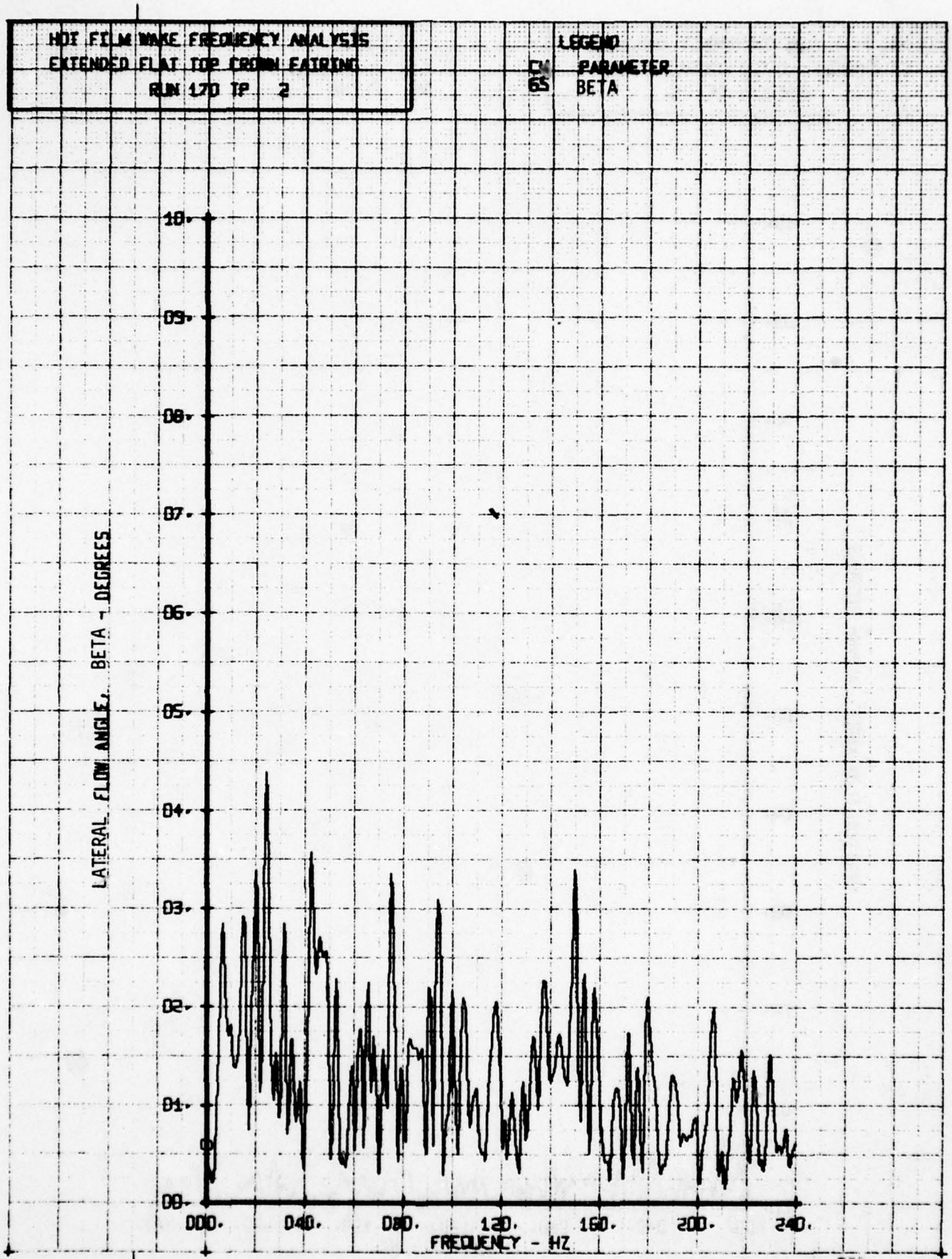
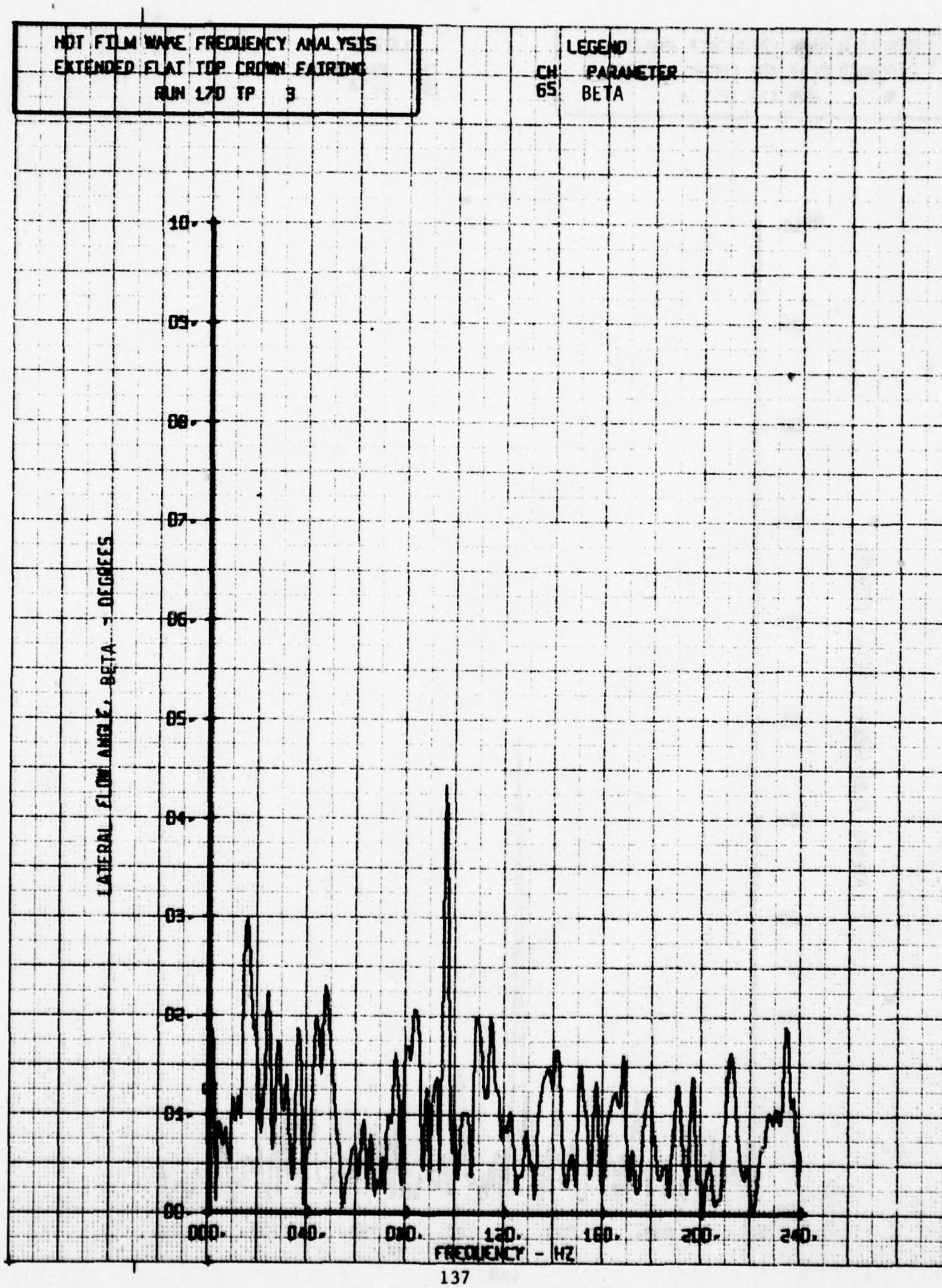
FREQUENCY - HZ


HOT FILM WAKE FREQUENCY ANALYSIS
EXTENDED FLAT TOP CROWN FAIRING
RUN 170 TP 2
LEGEND
CH PARAMETER
65 BETA
LATERAL FLOW ANGLE, BETA - DEGREES
FREQUENCY - HZ


HOT FILM WAKE FREQUENCY ANALYSIS
EXTENDED FLAT TOP CROWN FAIRING
RUN 170 TP 3
LEGEND
CH PARAMETER
65 BETA
LATERAL FLOW ANGLE, BETA - DEGREES
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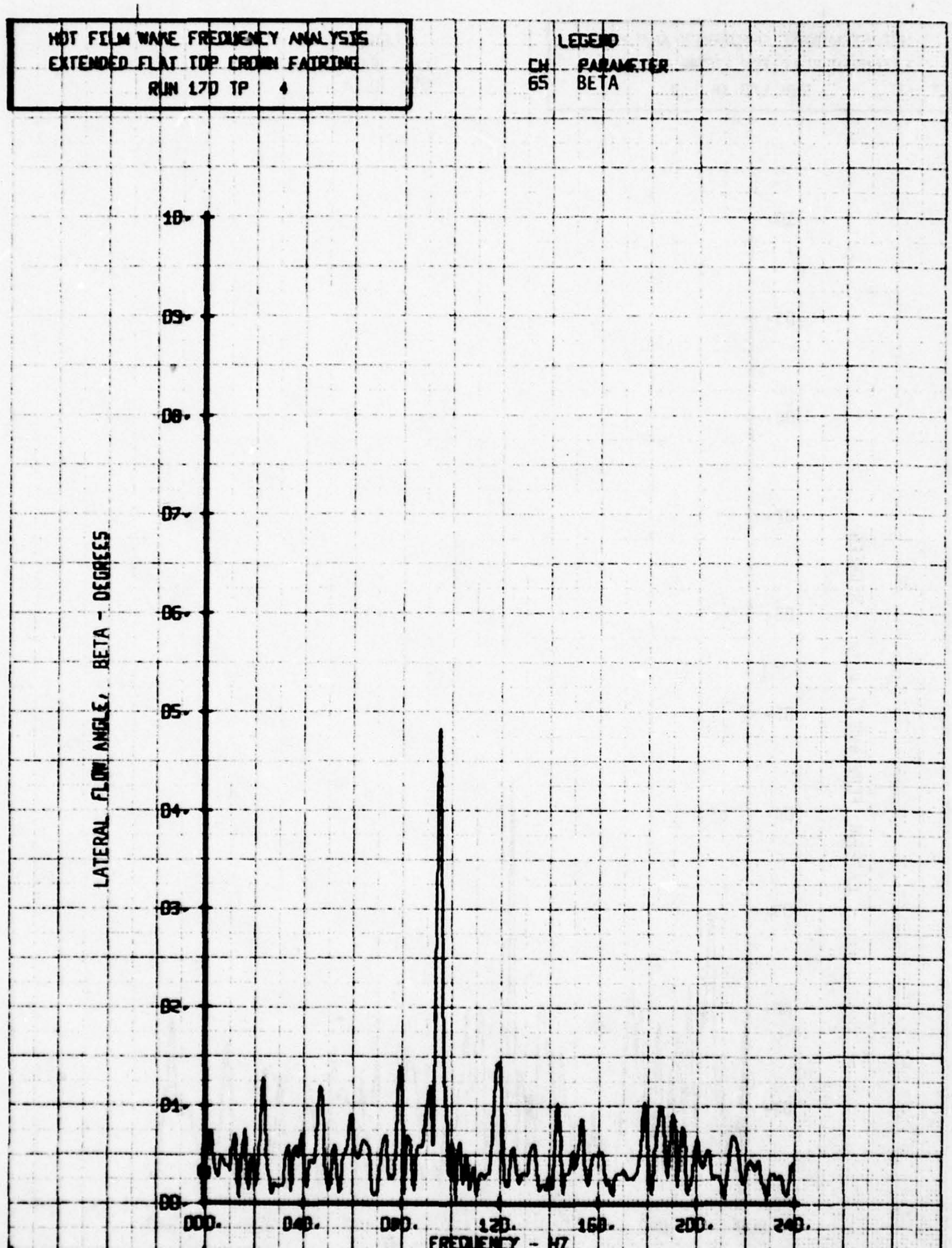
FREQUENCY - HZ



HOT FILM WAKE FREQUENCY ANALYSIS
EXTENDED FLAT TOP CROWN FAIRING
RUN 170 TP 4
LEGEND
CH PARAMETER
65 BETA
LATERAL FLOW ANGLE, BETA - DEGREES
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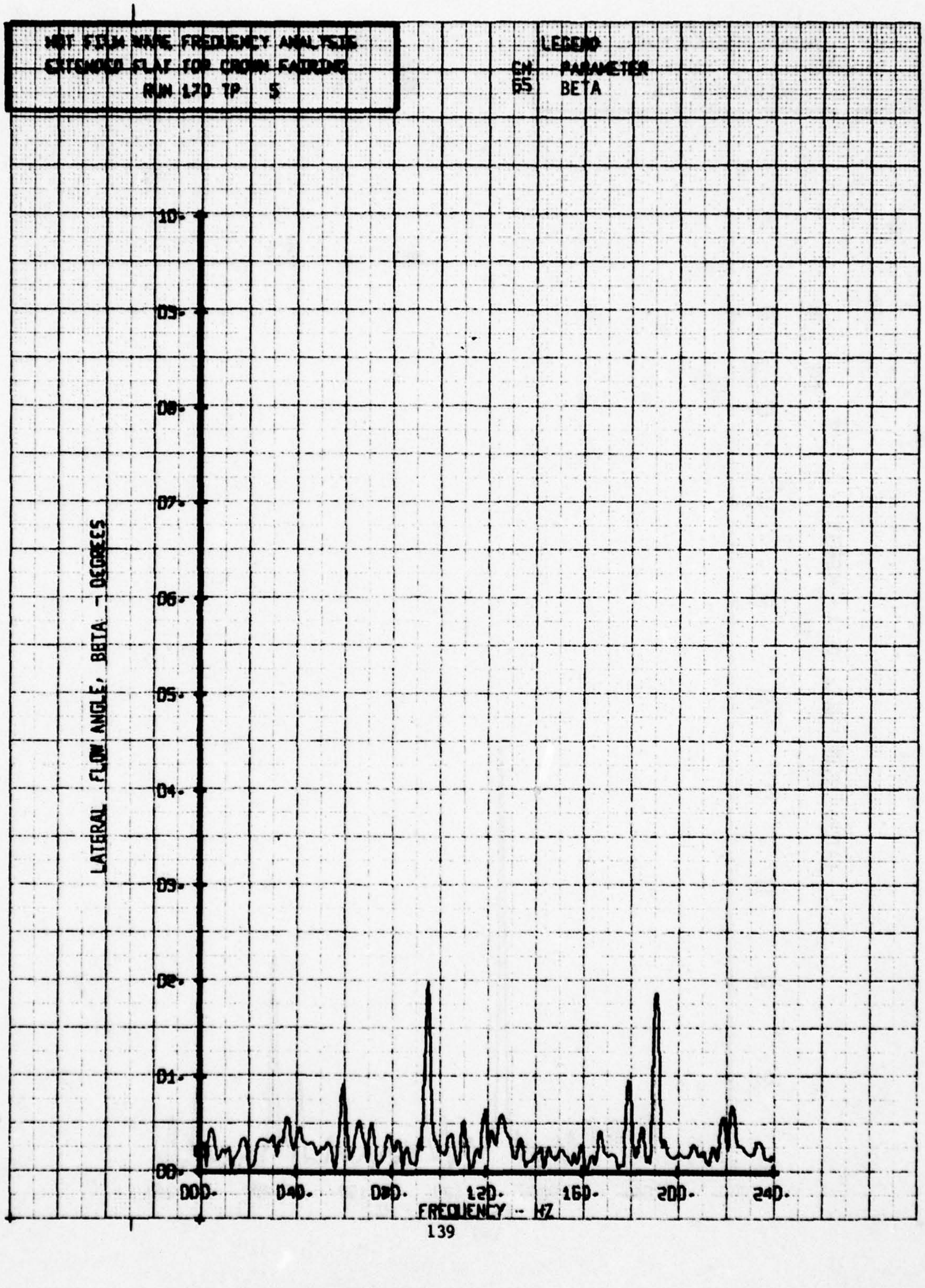
FREQUENCY - HZ



HOT FILM WAKE FREQUENCY ANALYSIS
EXTENDED FLAP FOR CROWN FAIRING
RUN 170 TP 5
LEGEND
CH PARAMETER
65 BETA
LATERAL FLOW ANGLE, BETA - DEGREES
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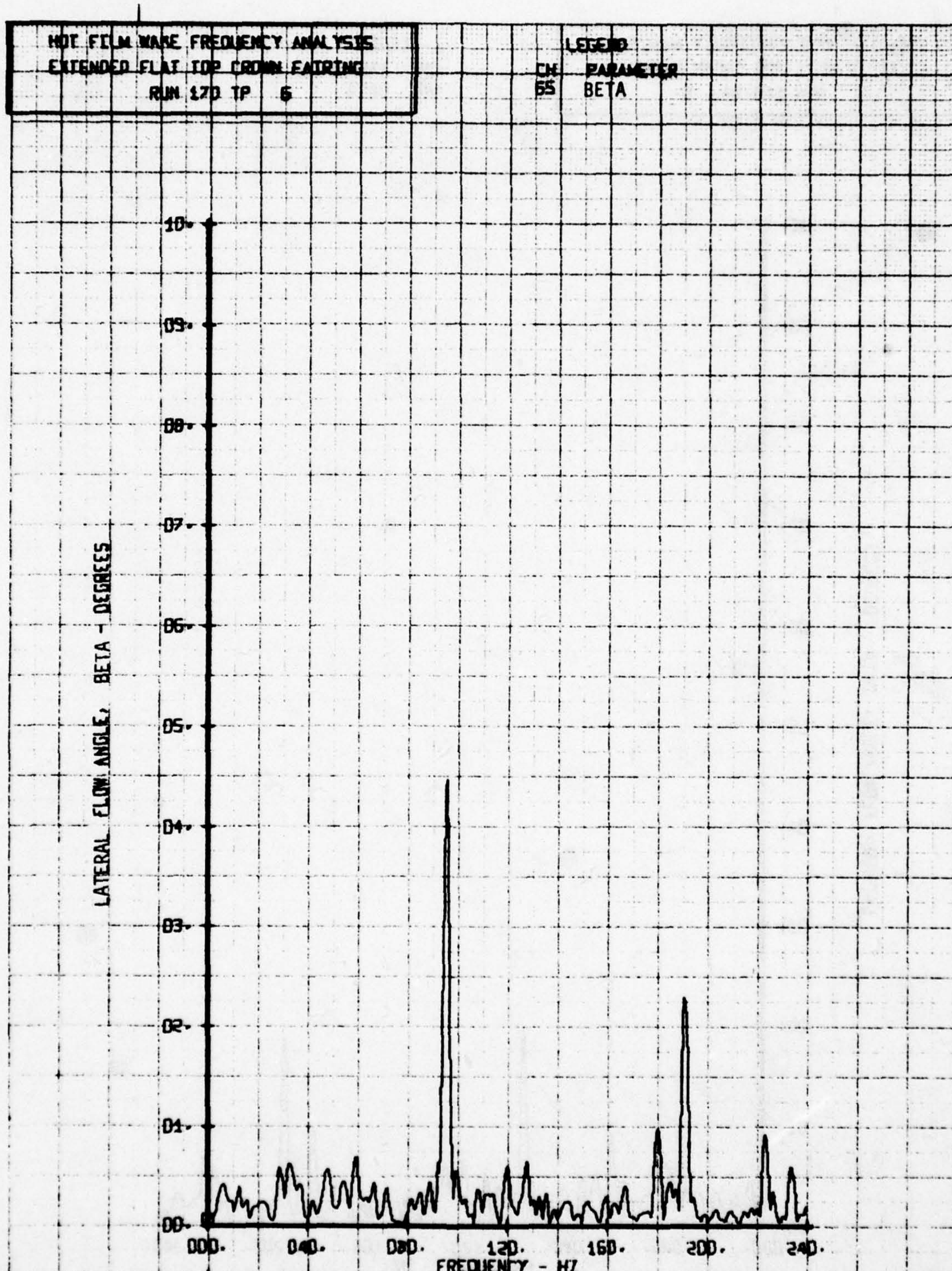
FREQUENCY - HZ


HOT FILM WAKE FREQUENCY ANALYSIS
EXTENDED FLAT TOP CROWN FAIRING
RUN 170 TP 6
LEGEND
CH. PARAMETER
65 BETA
LATERAL FLOW ANGLE, BETA - DEGREES
FREQUENCY - HZ
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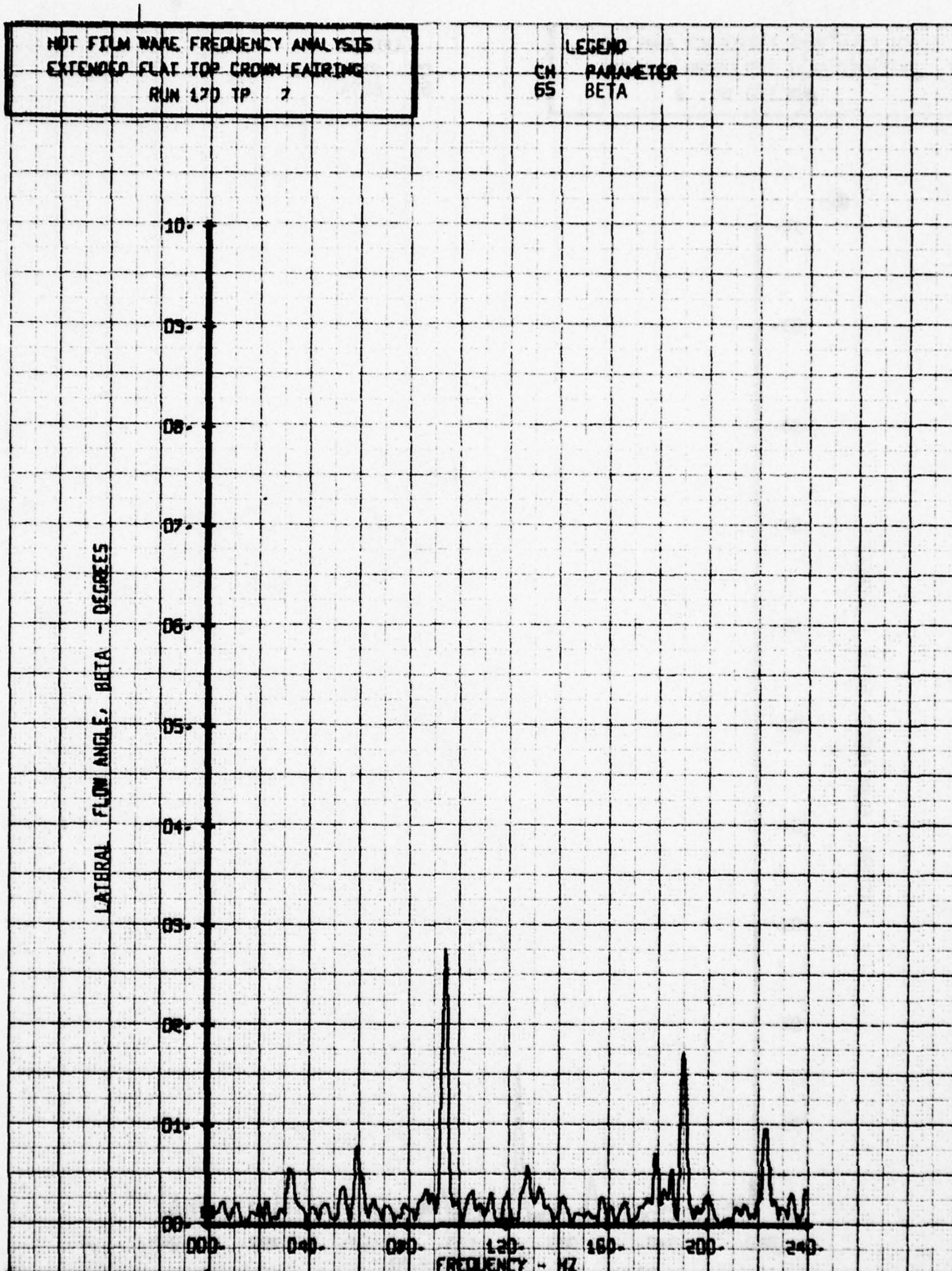
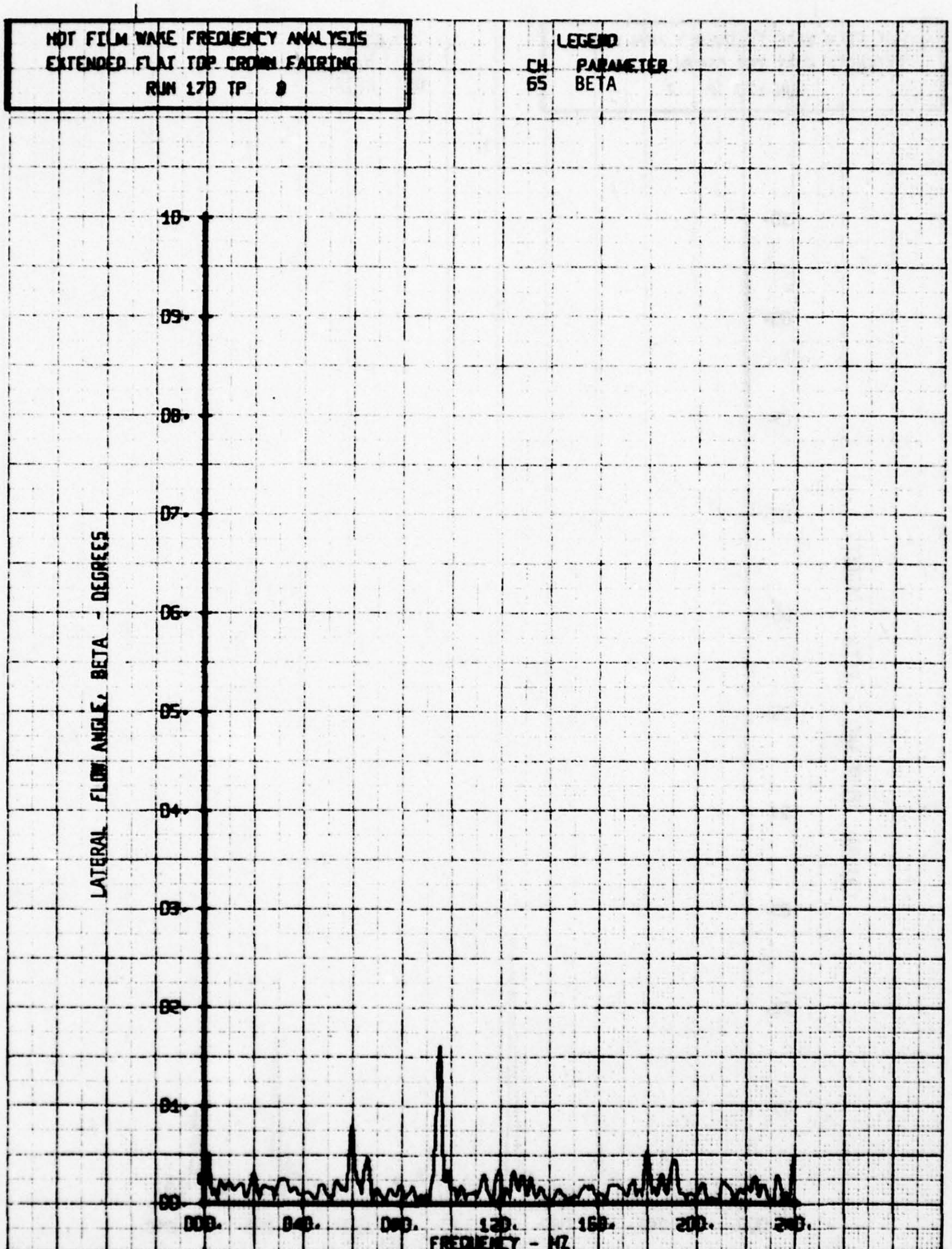
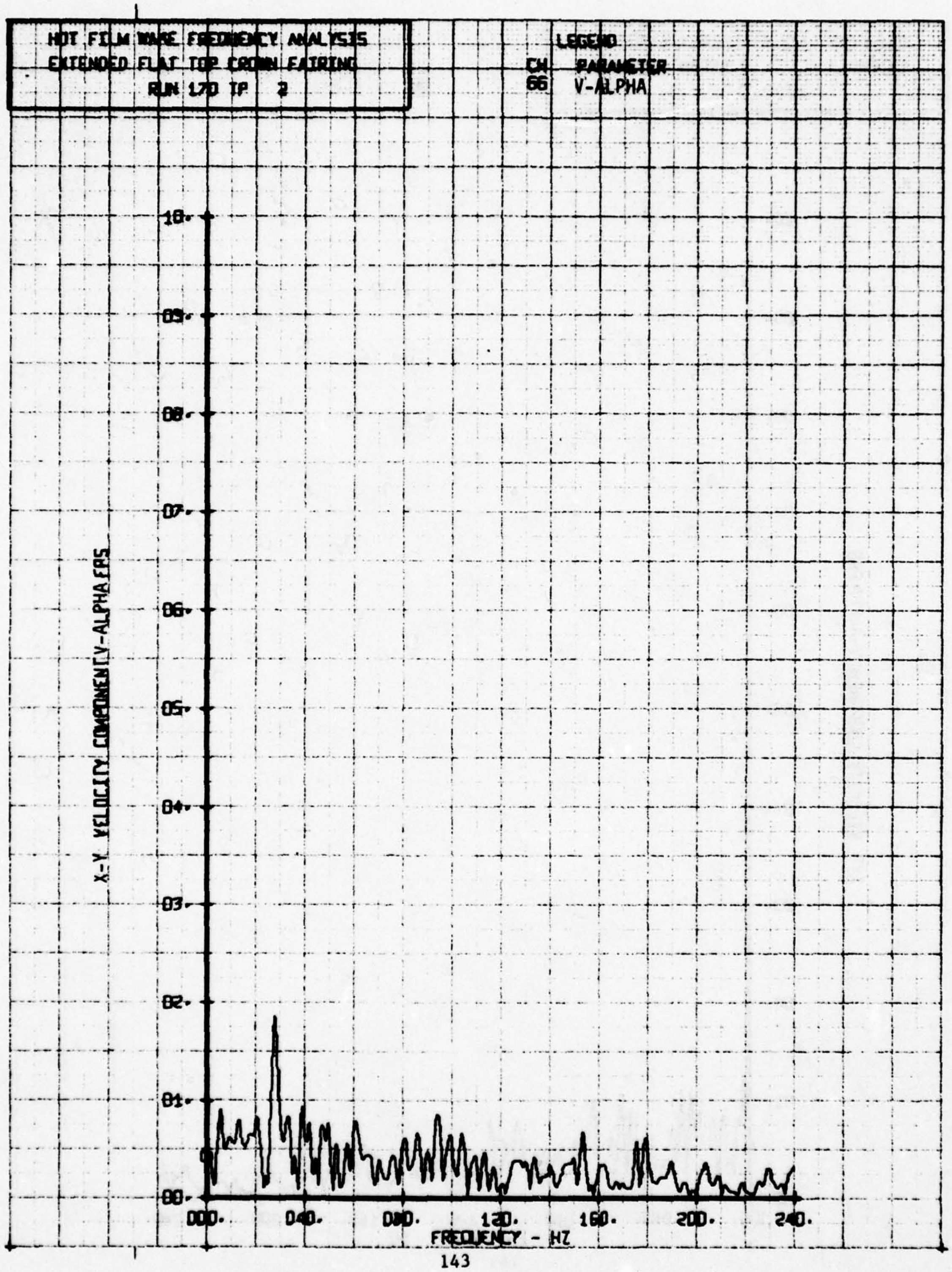

HOT FILM WAKE FREQUENCY ANALYSIS
EXTENDED FLAT TOP CROWN FAIRING
RUN 170 TP 7
LEGEND
CH PARAMETER
65 BETA
LATERAL FLOW ANGLE, BETA - DEGREES
FREQUENCY - HZ


HOT FILM WAKE FREQUENCY ANALYSIS
EXTENDED FLAT TOP CROWN FAIRING
RUN 170 TP 8
LEGEND
CH PARAMETER
65 BETA
LATERAL FLOW ANGLE, BETA - DEGREES
FREQUENCY - HZ



HOT FILM WAKE FREQUENCY ANALYSIS
EXTENDED FLAT TOP CROWN FAIRING
RUN 170 TP 2
LEGEND
CH PARAMETER
66 V-ALPHA
X-Y VELOCITY COMPONENT V-ALPHA FPS
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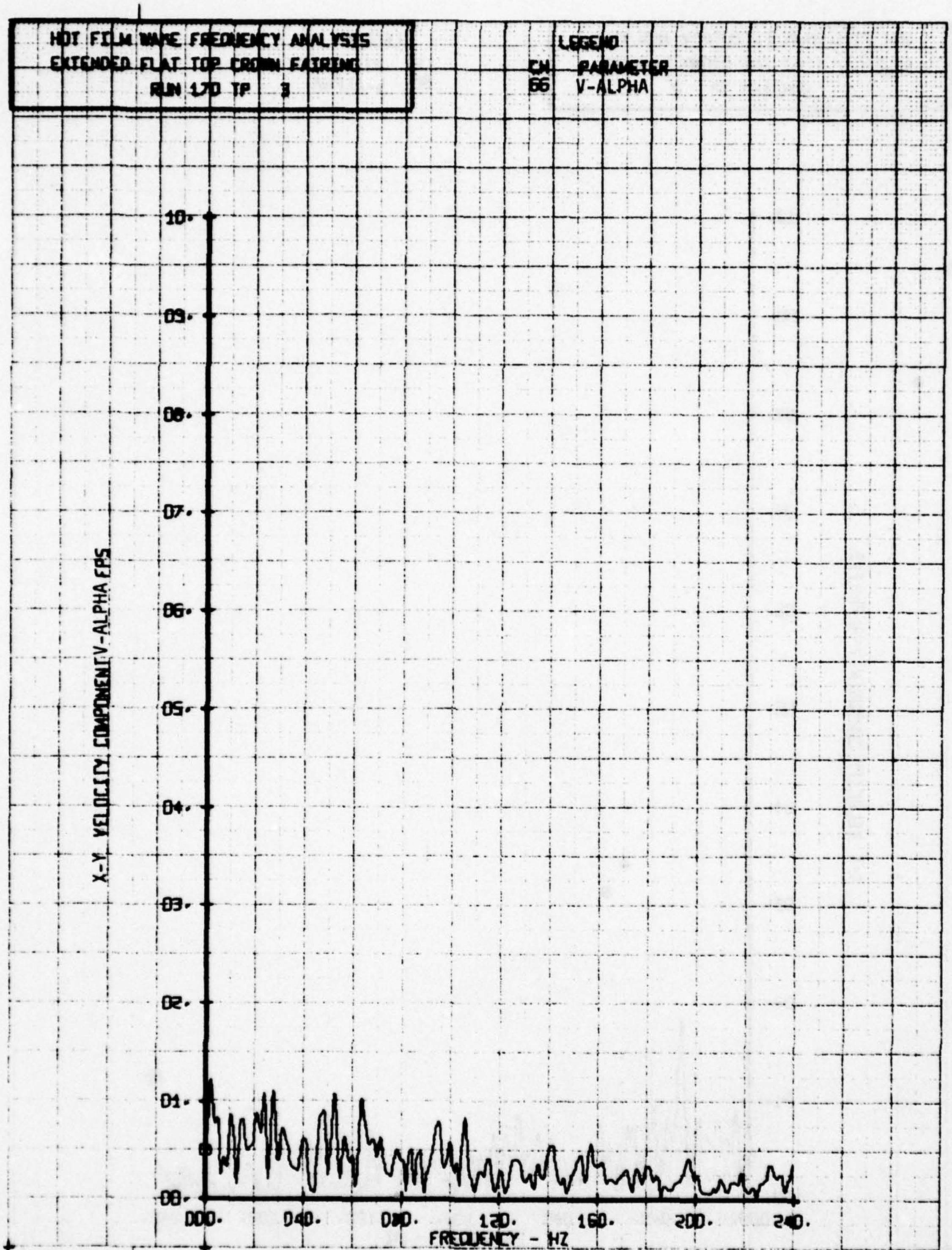
FREQUENCY - HZ



HOT FILM WAKE FREQUENCY ANALYSIS
EXTENDED FLAT TOP CROWN FAIRING
RUN 170 TP 3
LEGEND
CH PARAMETER
66 V-ALPHA
X-Y VELOCITY COMPONENT V-ALPHA FPS
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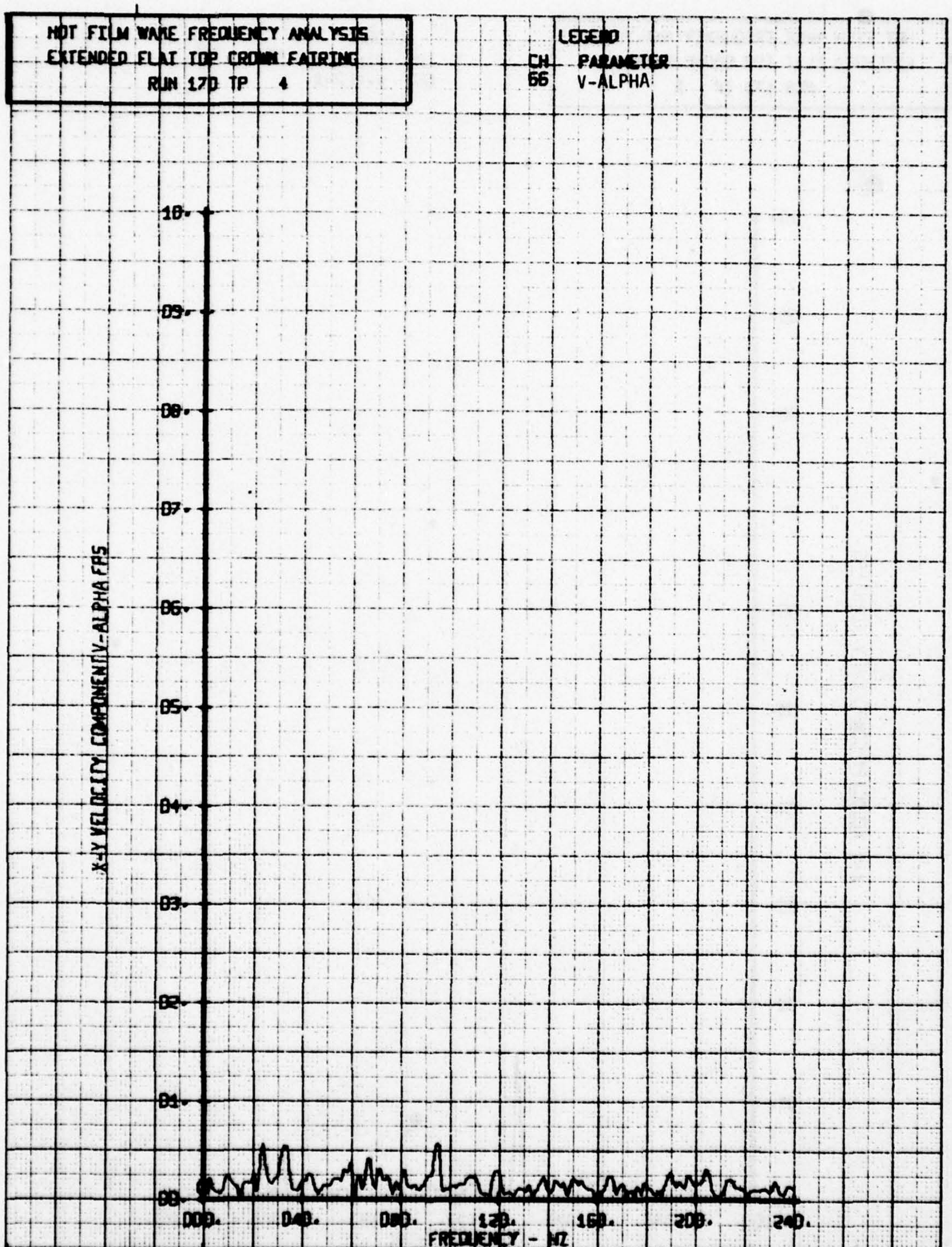
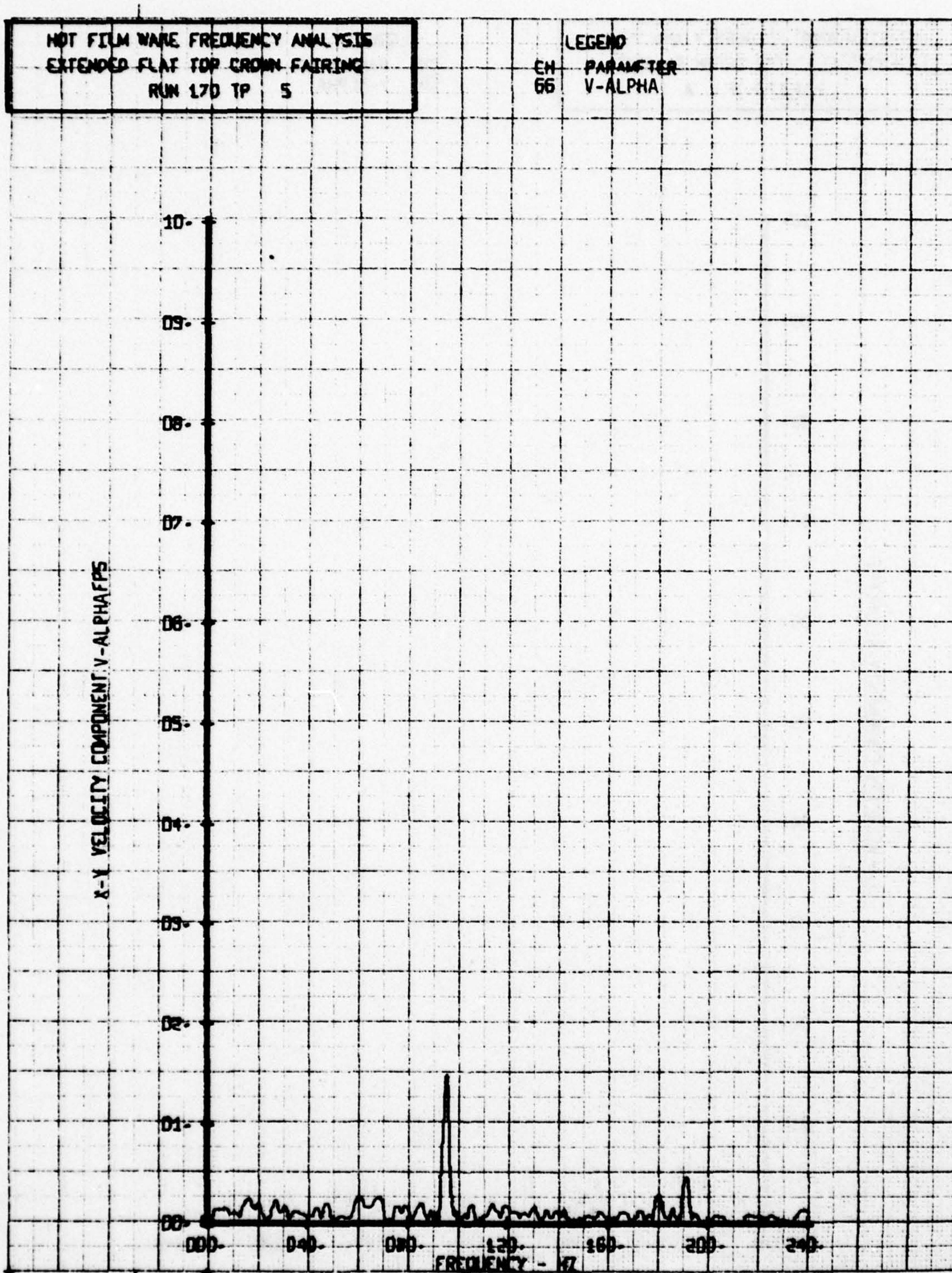
FREQUENCY - HZ



HOT FILM WAKE FREQUENCY ANALYSIS
EXTENDED FLAT TOP CROWN FAIRING
RUN 170 TP 4
LEGEND
CH PARAMETER
66 V-ALPHA
X-Y VELOCITY COMPONENT V-ALPHA FPS
FREQUENCY - HZ


HOT FILM WAKE FREQUENCY ANALYSIS
EXTENDED FLAT TOP CROWN FAIRING
RUN 170 TP 5
LEGEND
CH PARAMETER
66 V-ALPHA
X-Y VELOCITY COMPONENT V-ALPHAFPS
FREQUENCY - HZ
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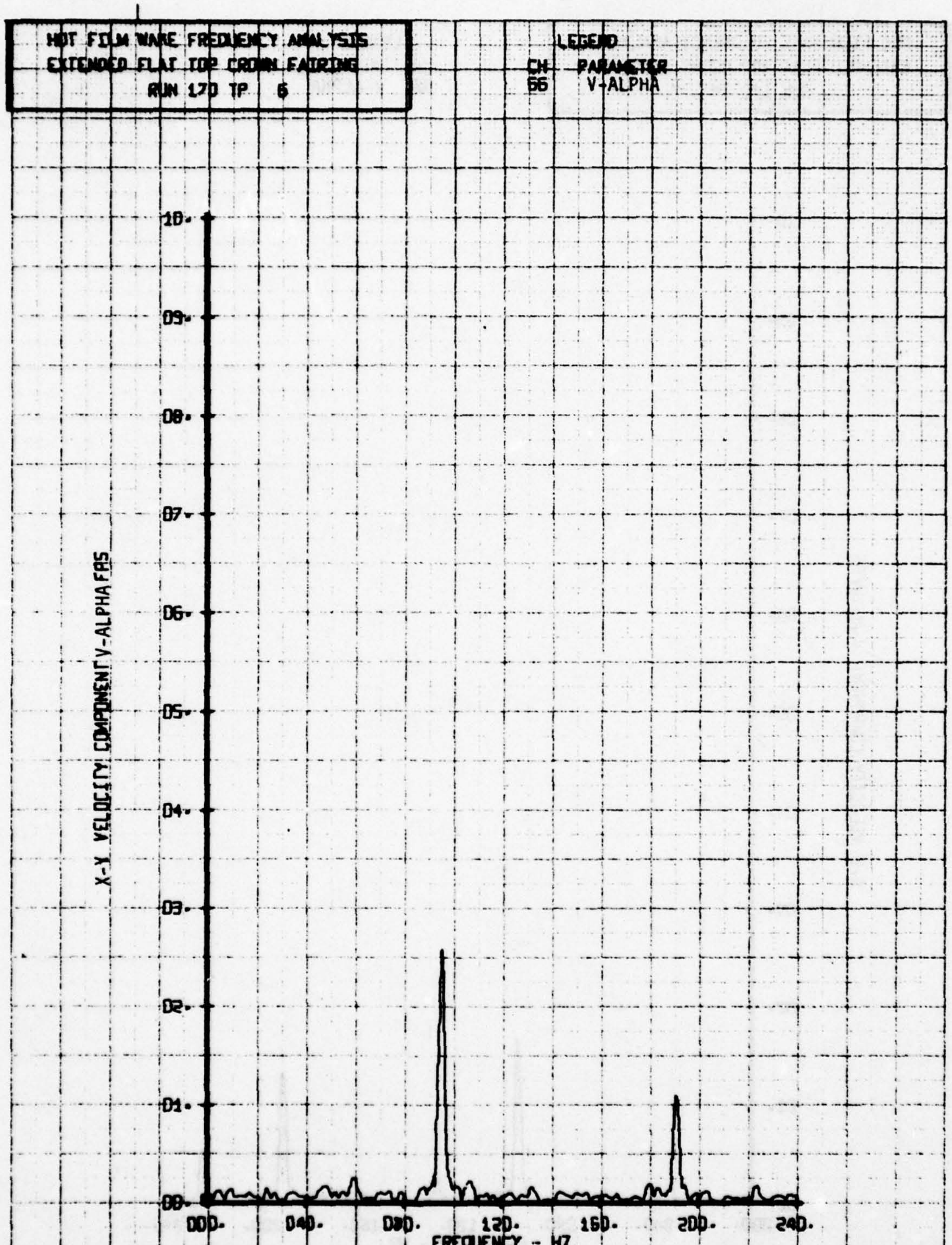
HOT FILM WAKE FREQUENCY ANALYSIS
EXTENDED FLAT TOP CROWN FAIRING
RUN 170 TP 6
LEGEND
CH PARAMETER
66 V-ALPHA
X-Y VELOCITY COMPONENT V-ALPHA FAS
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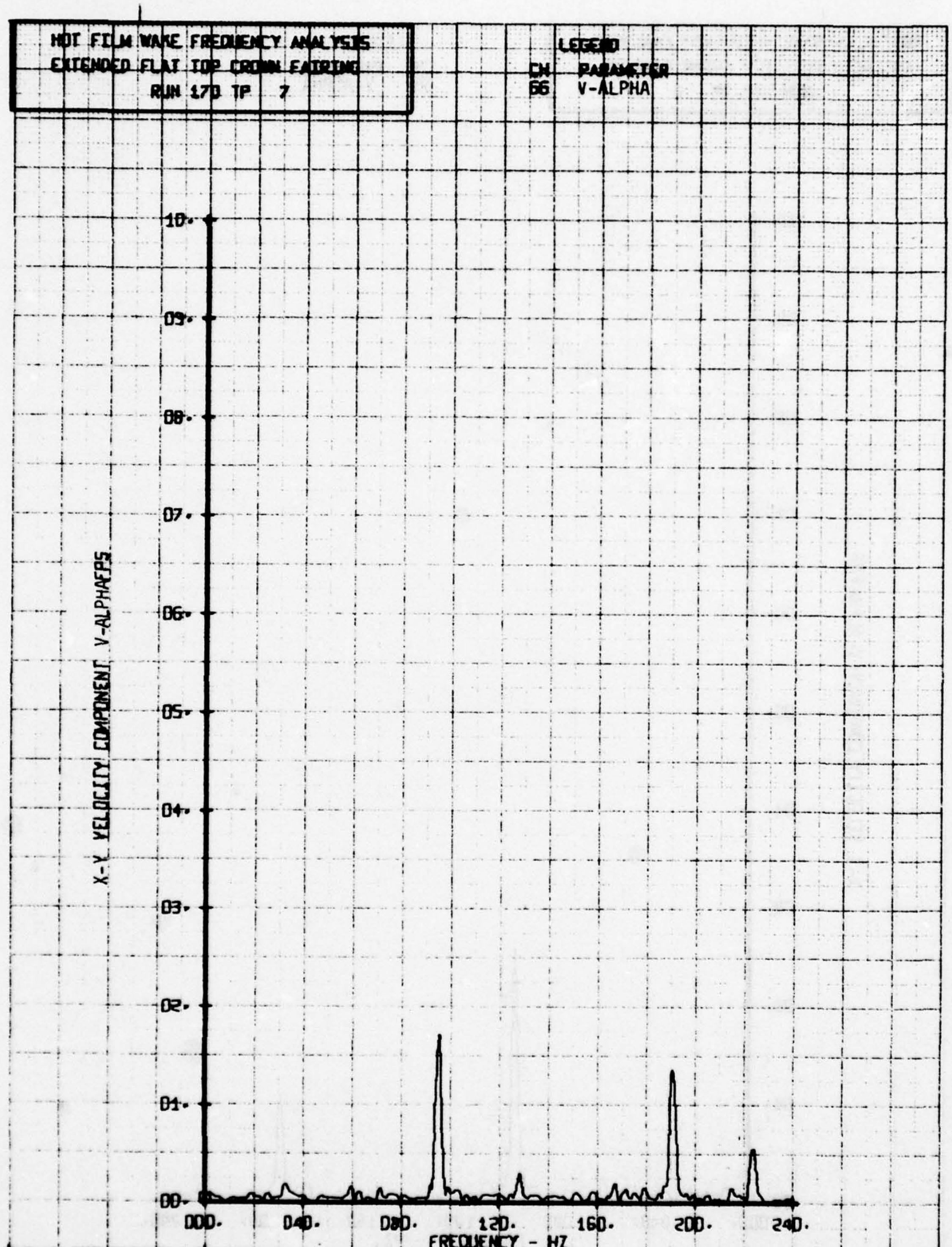
FREQUENCY - HZ



HOT FILM WAKE FREQUENCY ANALYSIS
EXTENDED FLAT TOP CROWN FAIRING
RUN 170 TP 7
LEGEND
CH PARAMETER
66 V-ALPHA
X-Y VELOCITY COMPONENT V-ALPHAFPS
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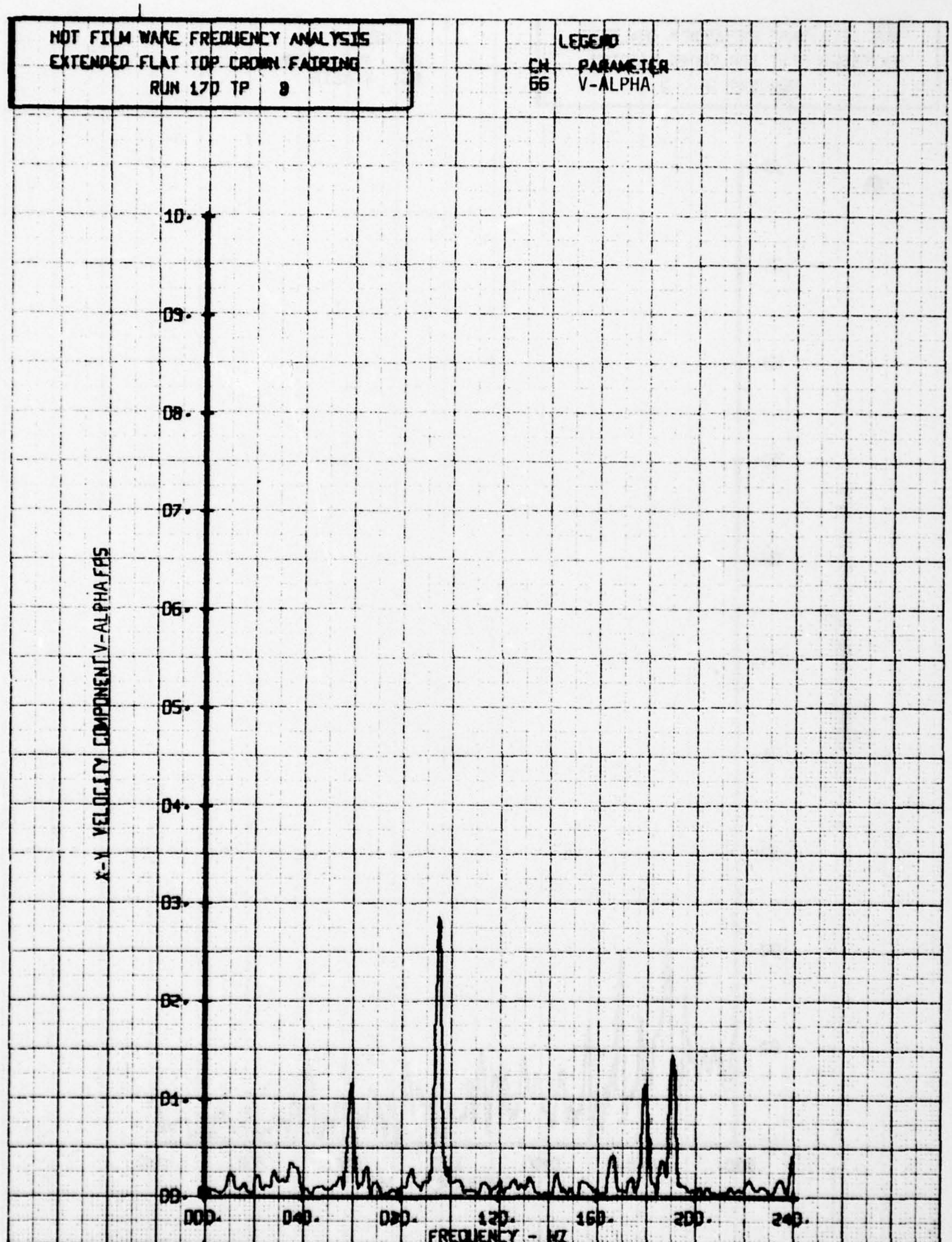
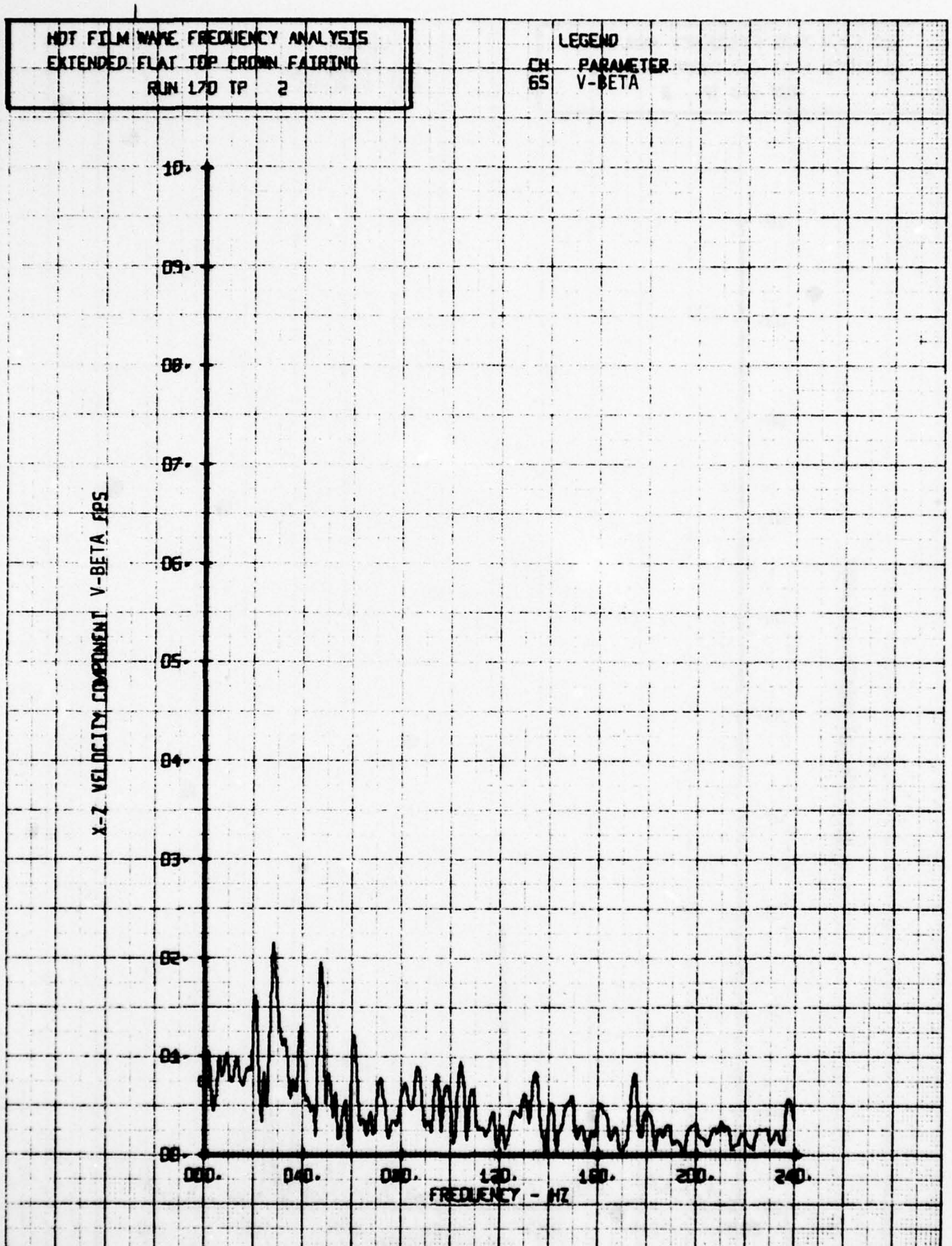
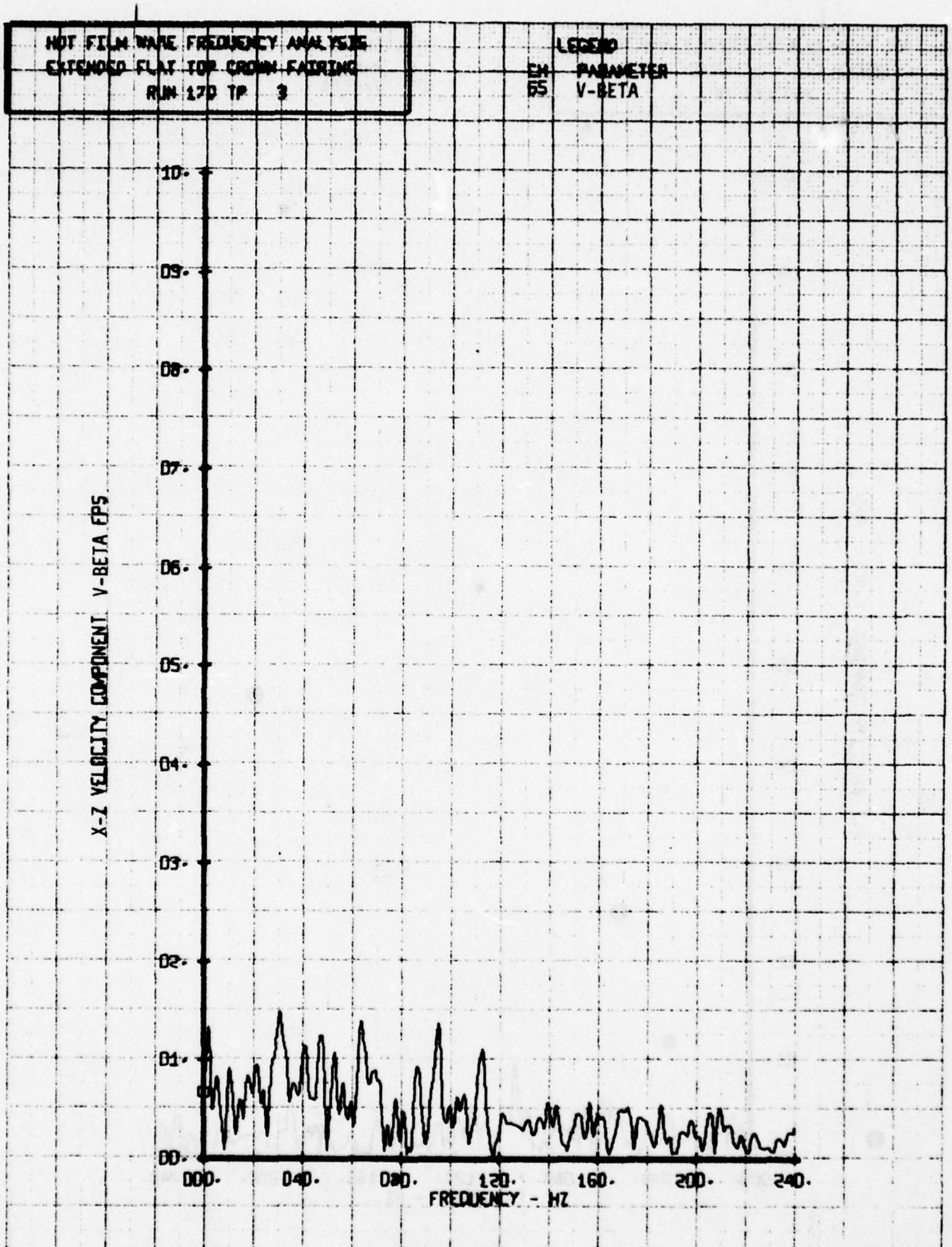
FREQUENCY - HZ



HOT FILM WAKE FREQUENCY ANALYSIS
EXTENDED FLAT TOP CROWN FAIRING
RUN 170 TP 8
LEGEND
CH PARAMETER
66 V-ALPHA
X-Y VELOCITY COMPONENT V-ALPHA FPS
FREQUENCY - HZ



HOT FILM WAKE FREQUENCY ANALYSIS
EXTENDED FLAT TOP CROWN FAIRING
RUN 170 TP 2
LEGEND
CH PARAMETER
65 V-BETA
X-Z VELOCITY COMPONENT V-BETA FPS
FREQUENCY - HZ


HOT FILM WAKE FREQUENCY ANALYSIS
EXTENDED FLAT TOP CROWN FAIRING
RUN 170 TP 3
LEGEND
CH PARAMETER
65 V-BETA
X-Z VELOCITY COMPONENT V-BETA FPS
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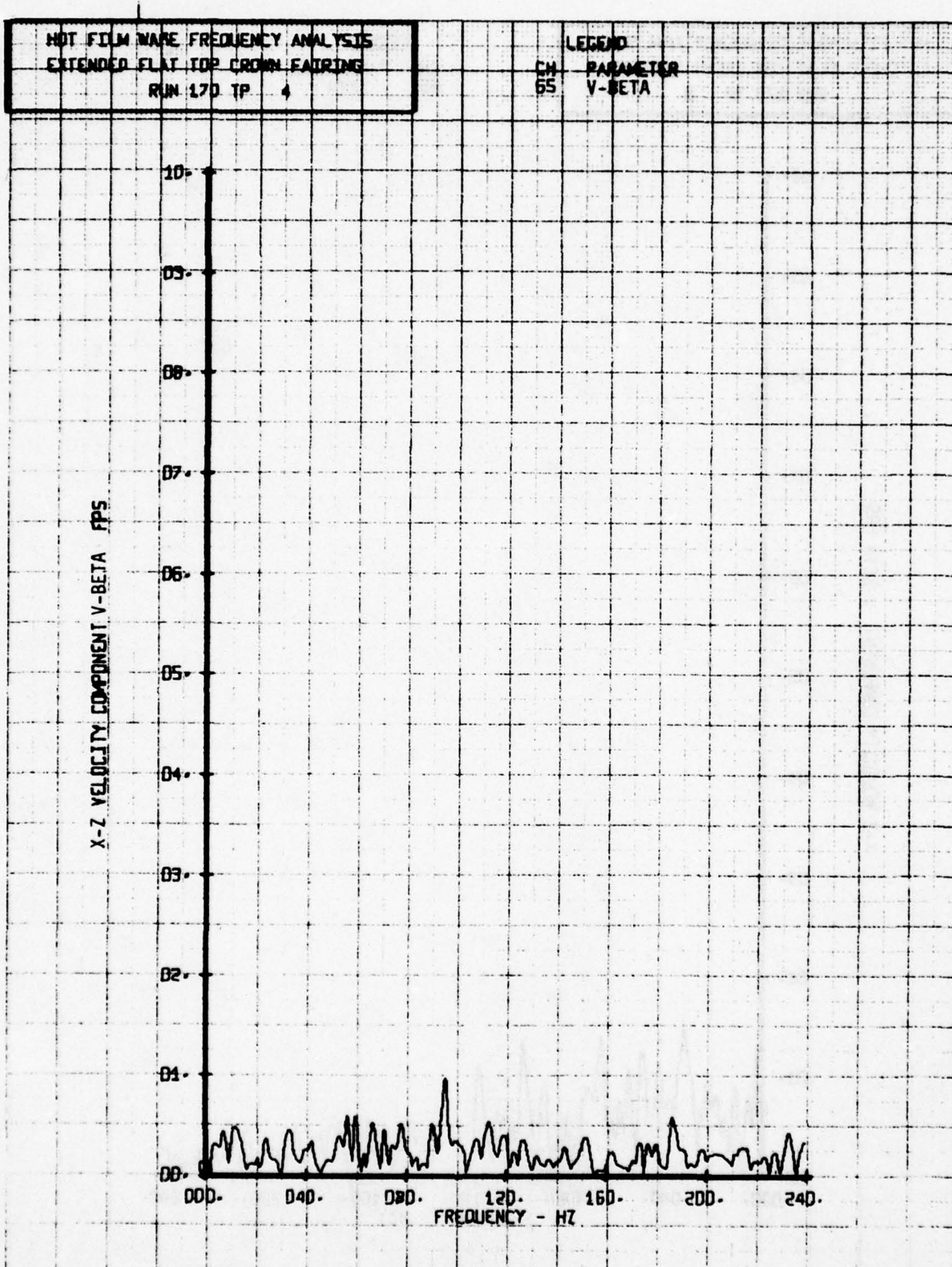
FREQUENCY - HZ


HOT FILM WAKE FREQUENCY ANALYSIS
EXTENDED FLAT TOP CROWN FAIRING
RUN 170 TP 4
LEGEND
CH PARAMETER
65 V-BETA
X-Z VELOCITY COMPONENT V-BETA FPS
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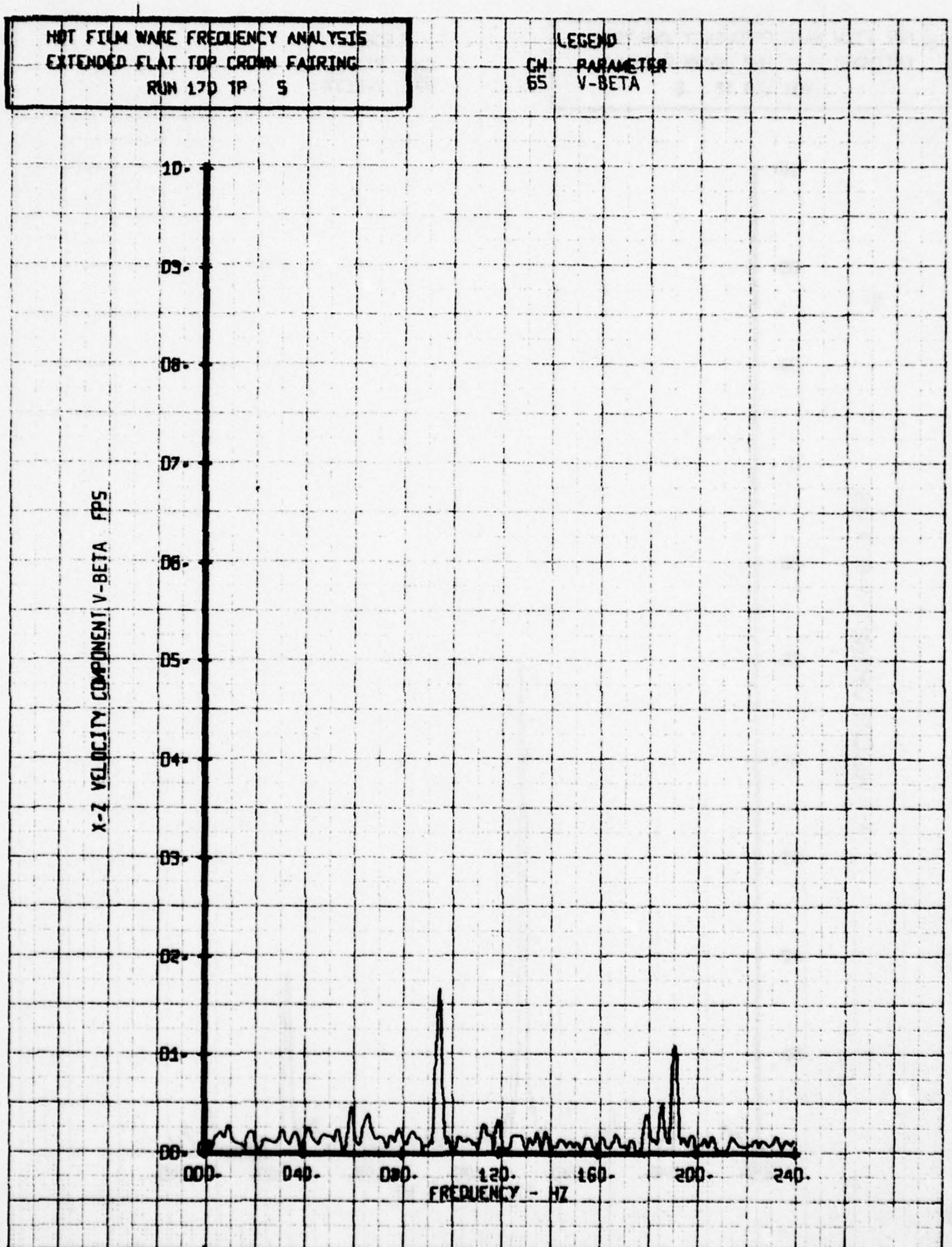
FREQUENCY - HZ


HOT FILM WAKE FREQUENCY ANALYSIS
EXTENDED FLAT TOP CROWN FAIRING
RUN 170 TP 5
LEGEND
CH PARAMETER
65 V-BETA
X-Z VELOCITY COMPONENT V-BETA FPS
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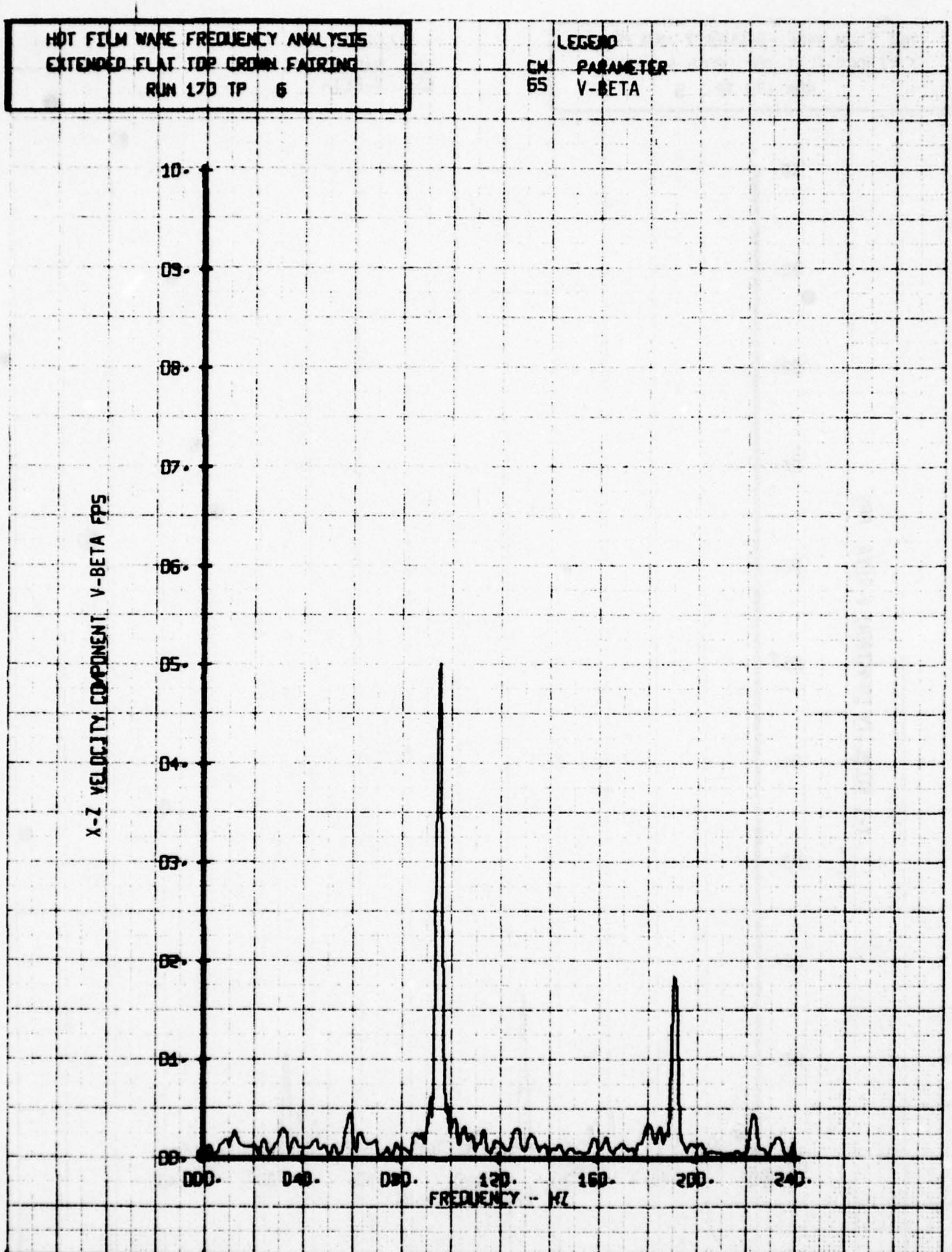
FREQUENCY - HZ


HOT FILM WAKE FREQUENCY ANALYSIS
EXTENDED FLAT TOP CROWN FAIRING
RUN 170 TP 6
LEGEND
CH PARAMETER
65 V-BETA
X-Z VELOCITY COMPONENT V-BETA FPS
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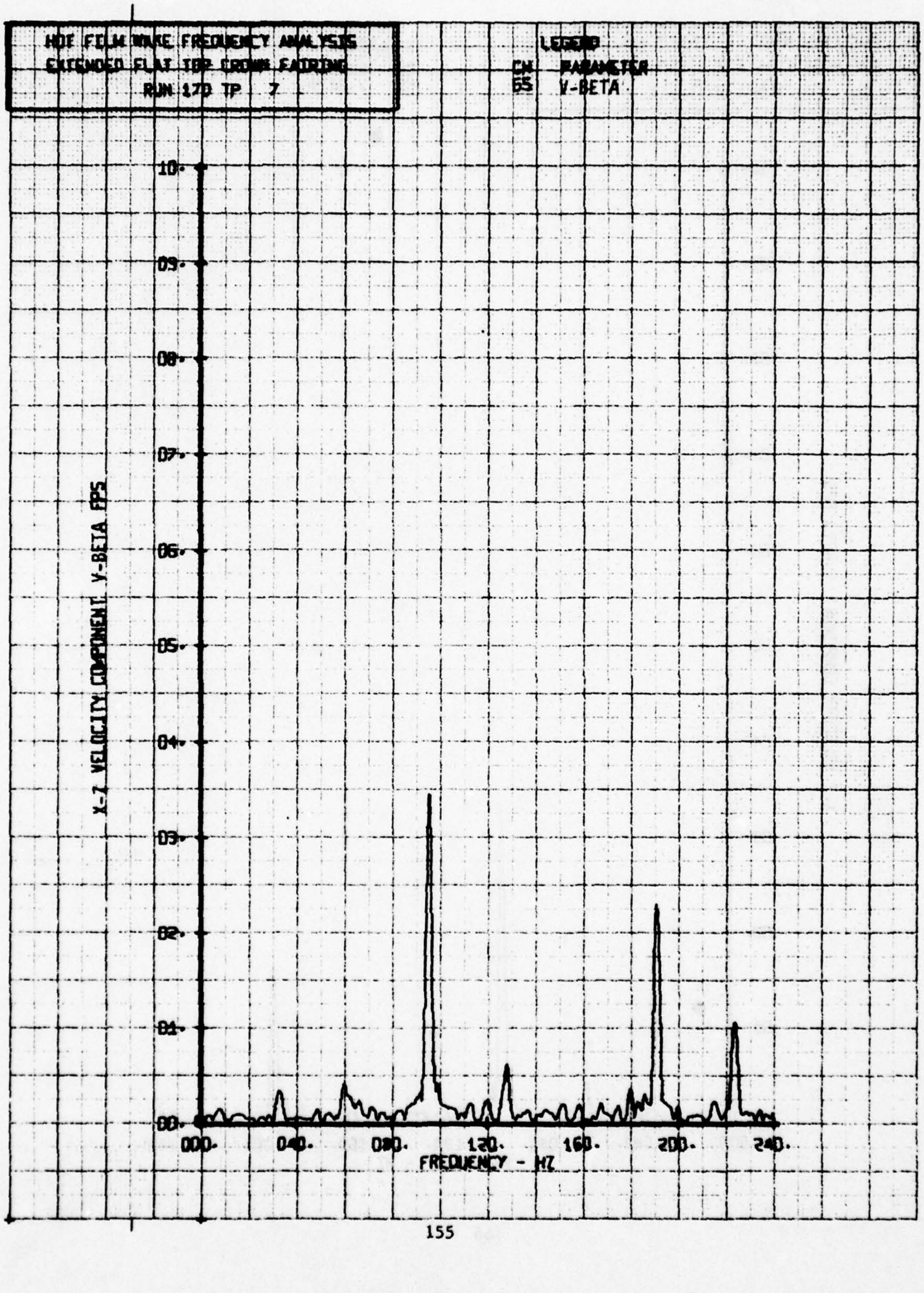
FREQUENCY - HZ



HOT FILM WAKE FREQUENCY ANALYSIS
EXTENDED FLAT TOP CROWN FAIRING
RUN 170 TP 7
LEGEND
CH PARAMETER
65 V-BETA
X-Z VELOCITY COMPONENT V-BETA FPS
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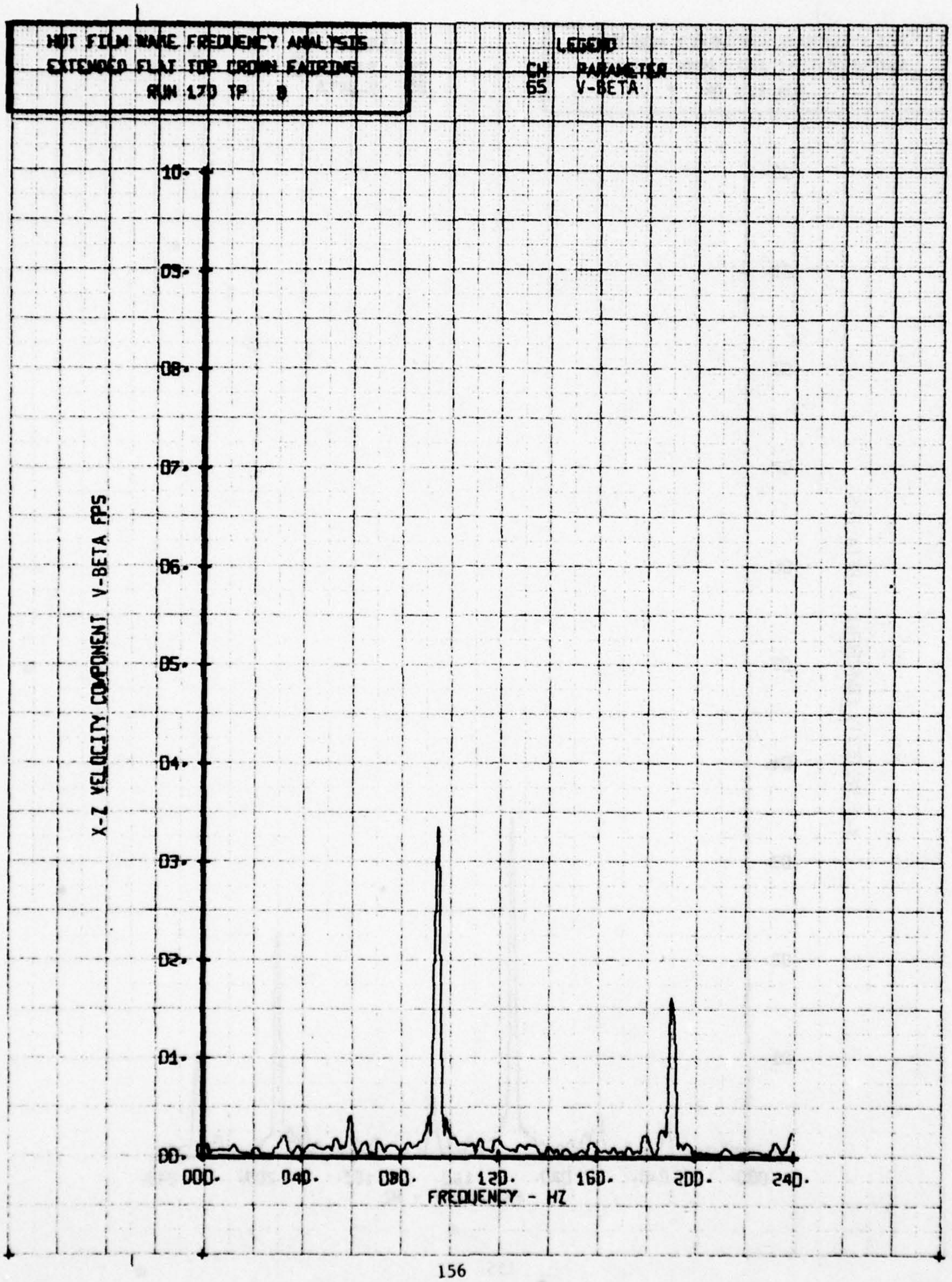
FREQUENCY - HZ


HOT FILM WAKE FREQUENCY ANALYSIS
EXTENDED FLAT TOP CROWN FAIRING
RUN 170 TP 8
LEGEND
CH PARAMETER
65 V-BETA
X-Z VELOCITY COMPONENT V-BETA FPS
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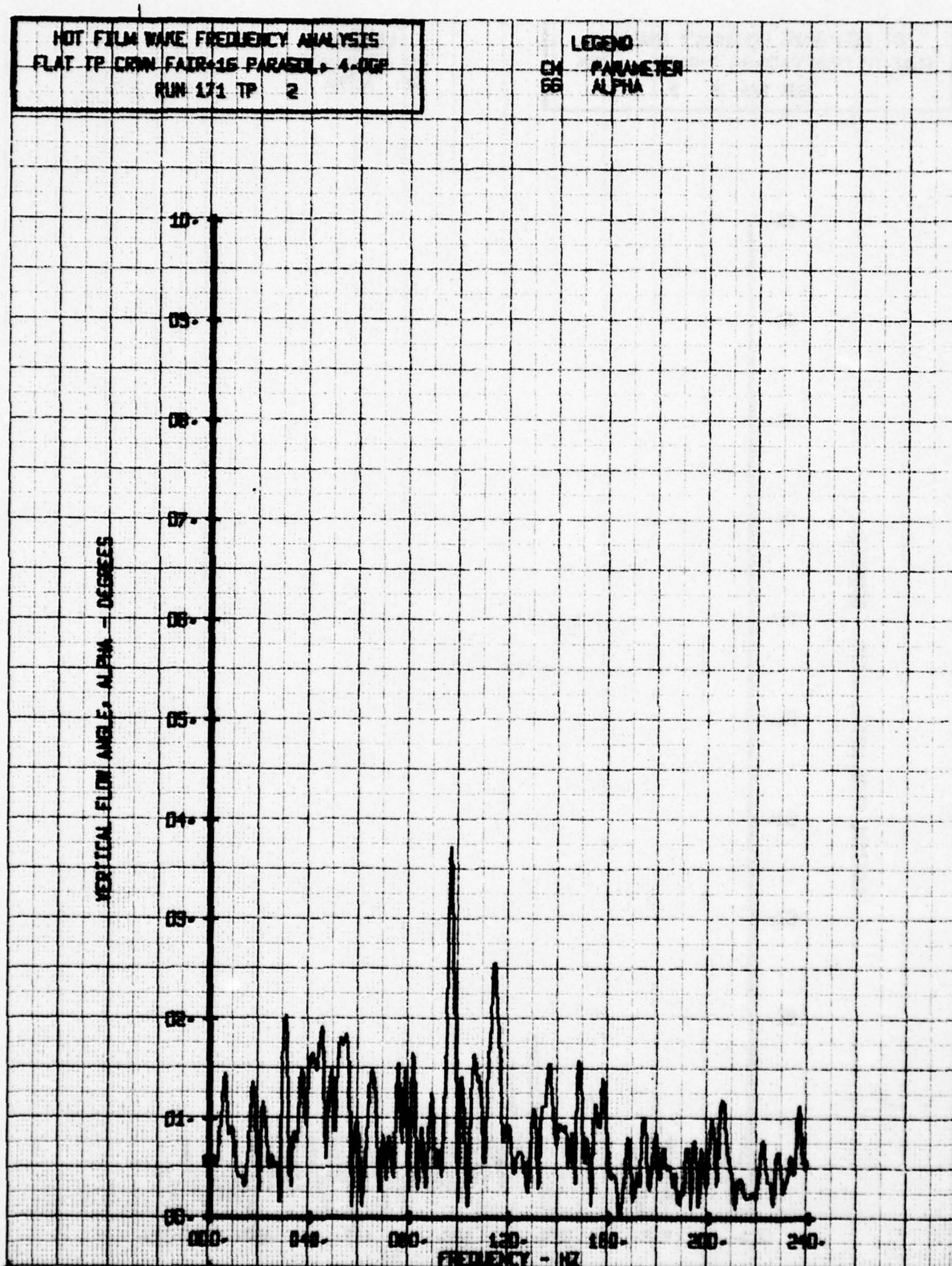
FREQUENCY - HZ



HOT FILM WAKE FREQUENCY ANALYSIS
FLAT TP CRWN FAIR+16 PARASOL, 4-0GP
RUN 171 TP 2
LEGEND
CH PARAMETER
66 ALPHA
VERTICAL FLOW ANGLE, ALPHA - DEGREES
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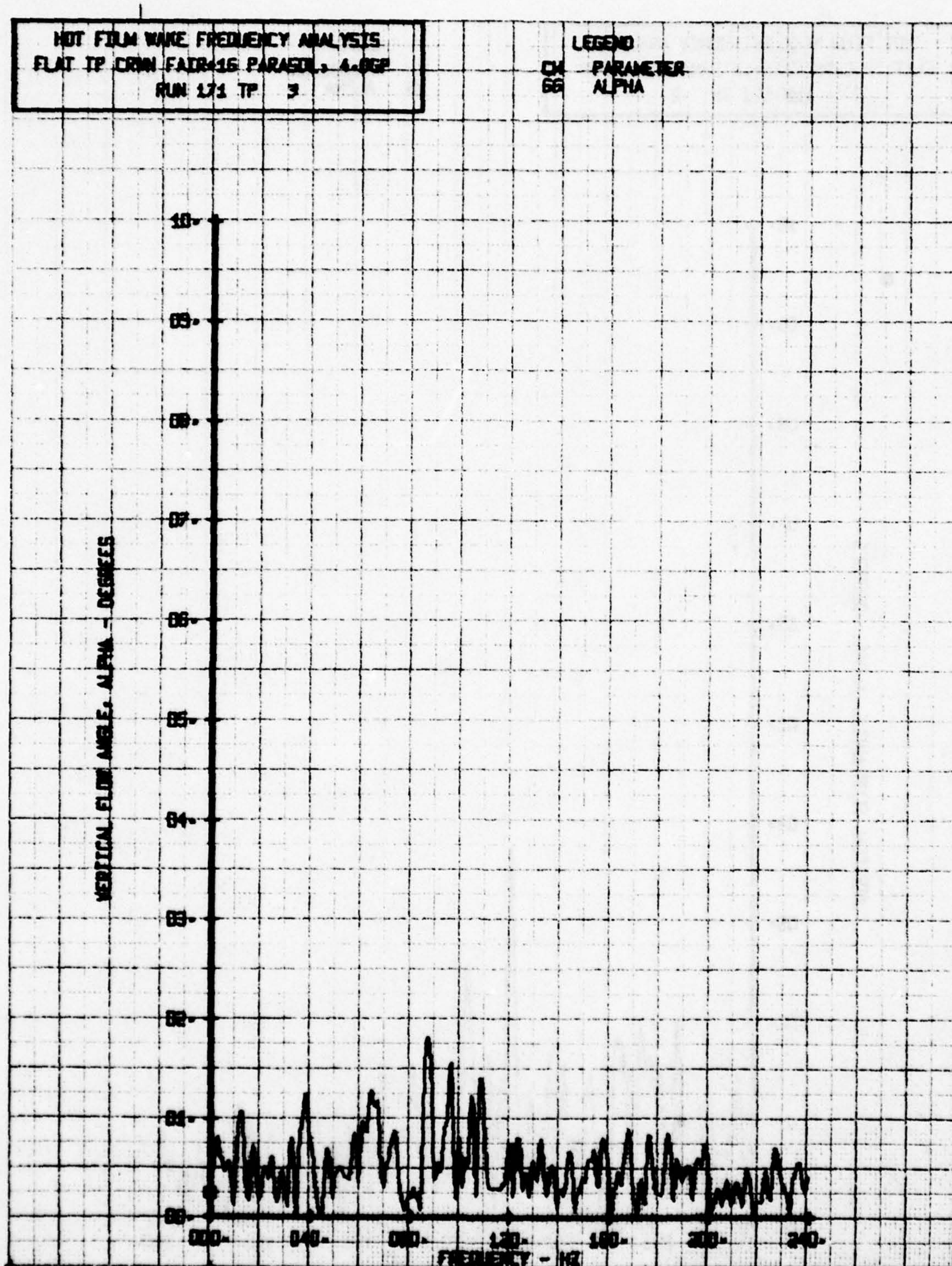
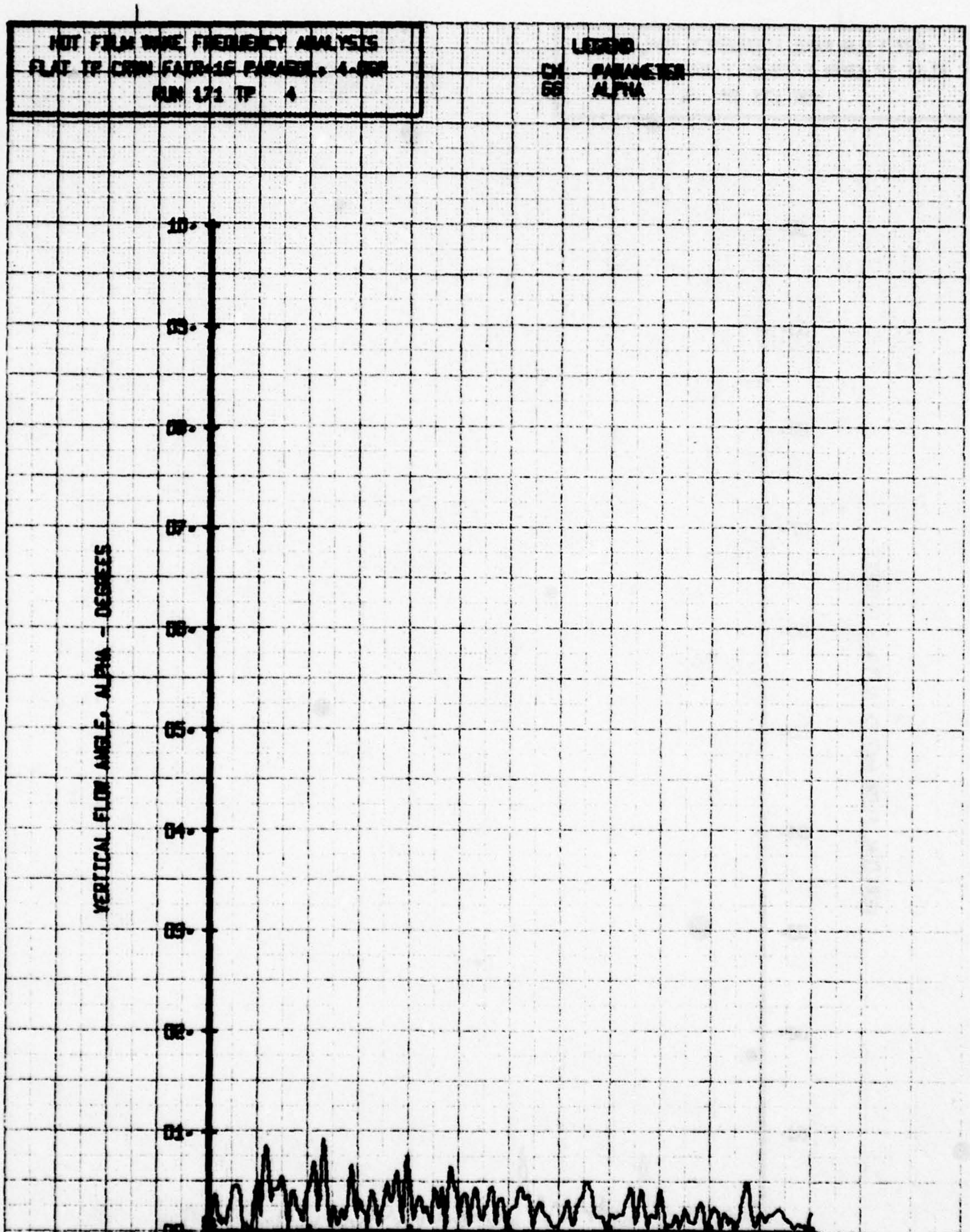
FREQUENCY - HZ


HOT FILM WAKE FREQUENCY ANALYSIS
FLAT TP CRWN FAIR+16 PARASOL, 4.8GP
RUN 171 TP 3
LEGEND
CM PARAMETER
GG ALPHA
VERTICAL FLOW ANGLE, ALPHA - DEGREES
FREQUENCY - HZ


HOT FILM WAKE FREQUENCY ANALYSIS
FLAT TP CROWN FAIR-16 PARABOL, 4-DGR
RUN 171 TP 4
LEGEND
CH PARAMETER
66 ALPHA
VERTICAL FLOW ANGLE, ALPHA - DEGREES
FREQUENCY - HZ
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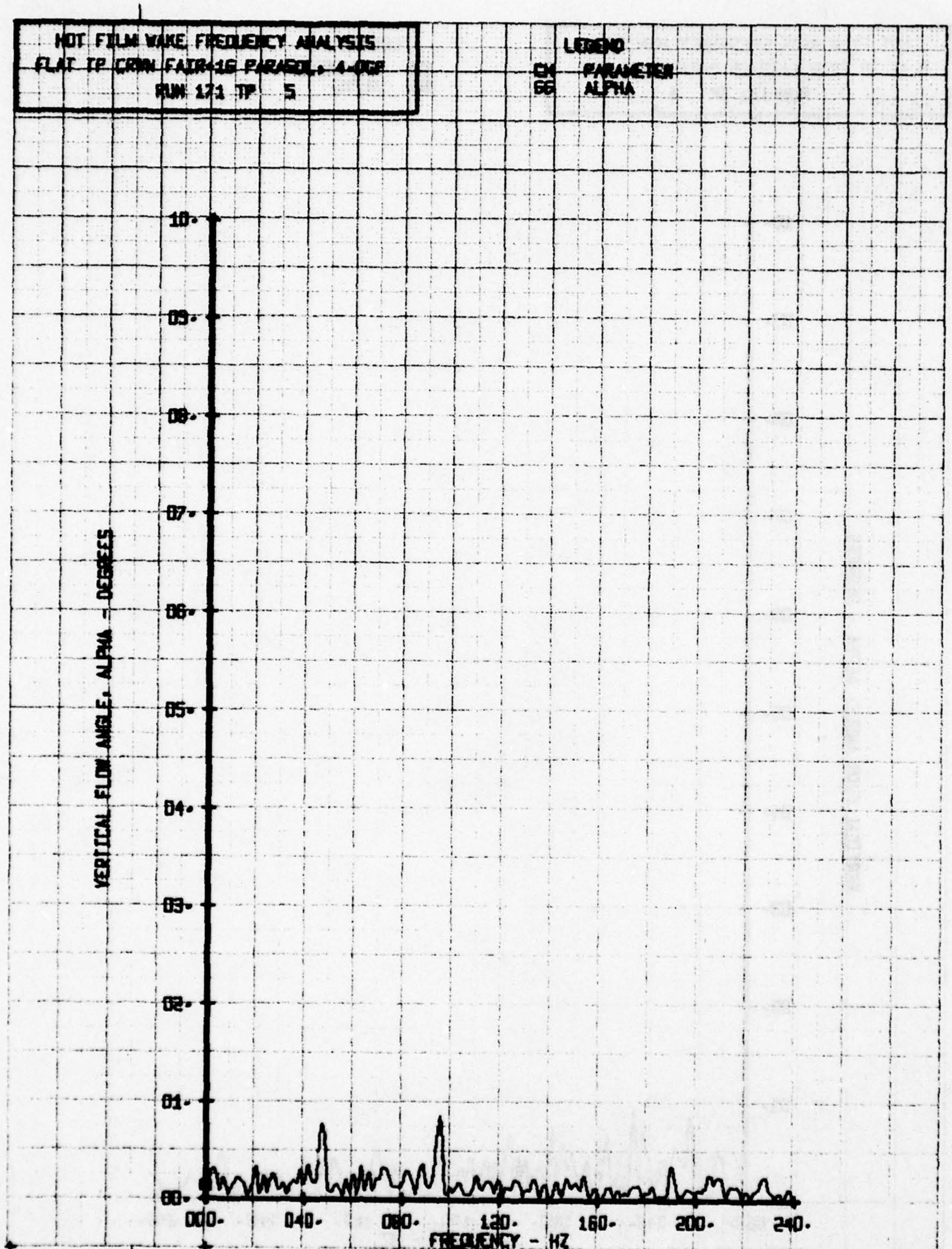

HOT FILM WAKE FREQUENCY ANALYSIS
FLAT TP CRWN FAIR+16 PARASOL, 4-DGR
RUN 171 TP 5
LEGEND
CM PARAMETER
66 ALPHA
VERTICAL FLOW ANGLE, ALPHA - DEGREES
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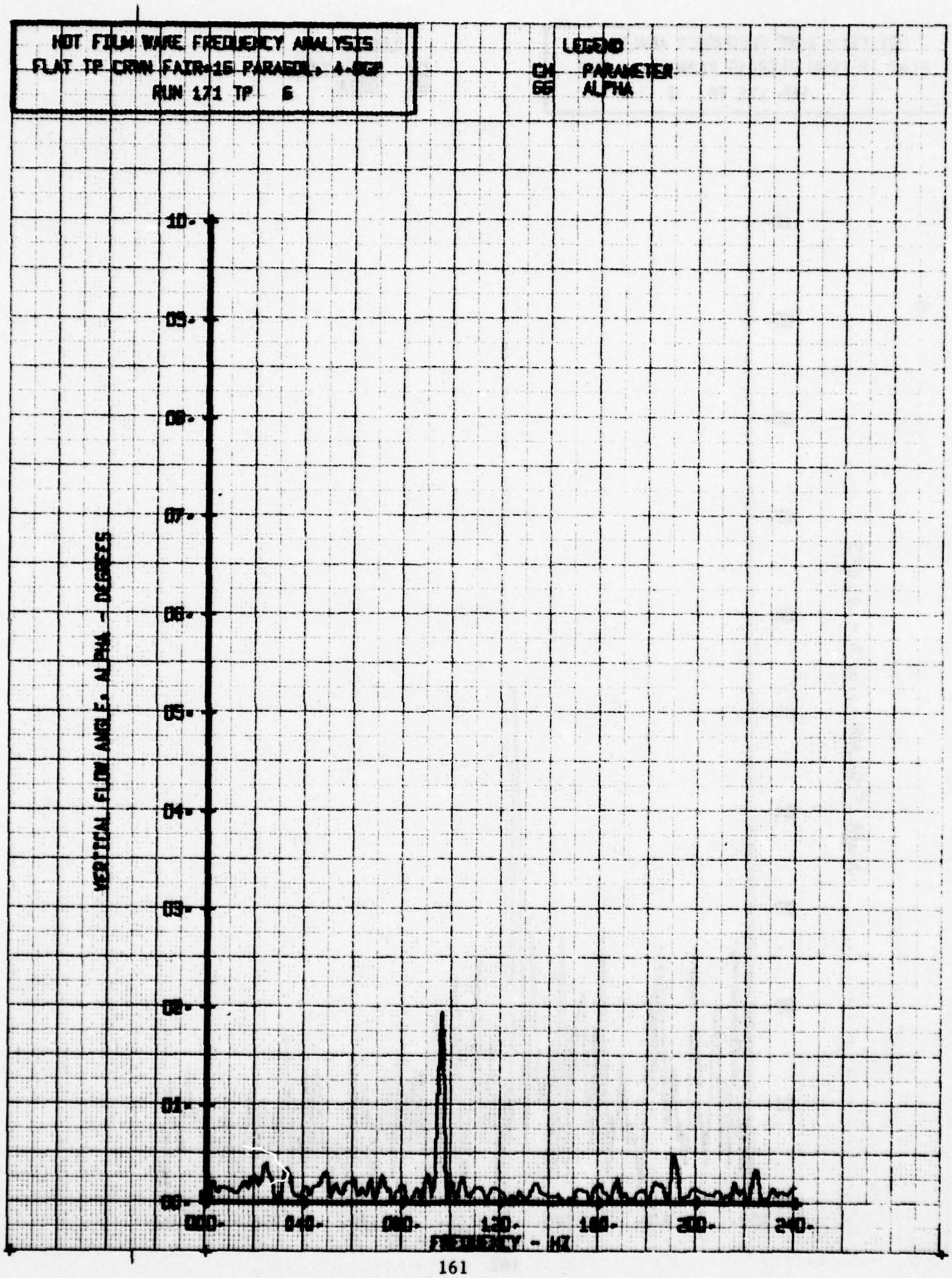
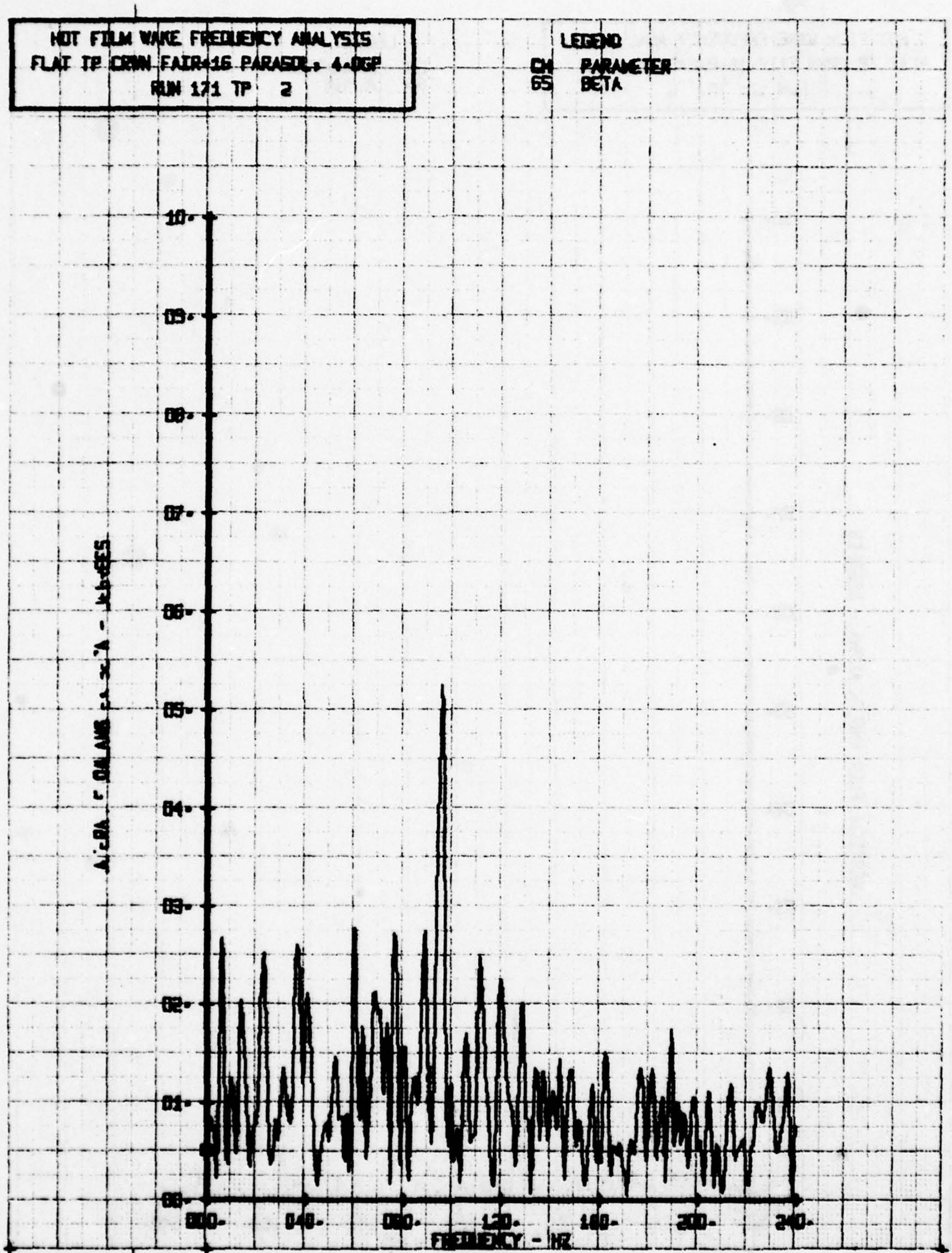
FREQUENCY - HZ



HOT FILM WAKE FREQUENCY ANALYSIS
FLAT TP CRWN FAIR=15 PARAGOL, 4-0GP
RUN 171 TP 6
LEGEND
CM PARAMETER
GG ALPHA
VERTICAL FLOW ANGLE, ALPHA - DEGREES
FREQUENCY - HZ


HOT FILM WAKE FREQUENCY ANALYSIS
FLAT TP CRWN FAIR+16 PARASOL+ 4.0GP
RUN 171 TP 2
LEGEND
CH PARAMETER
65 BETA
FREQUENCY - HZ
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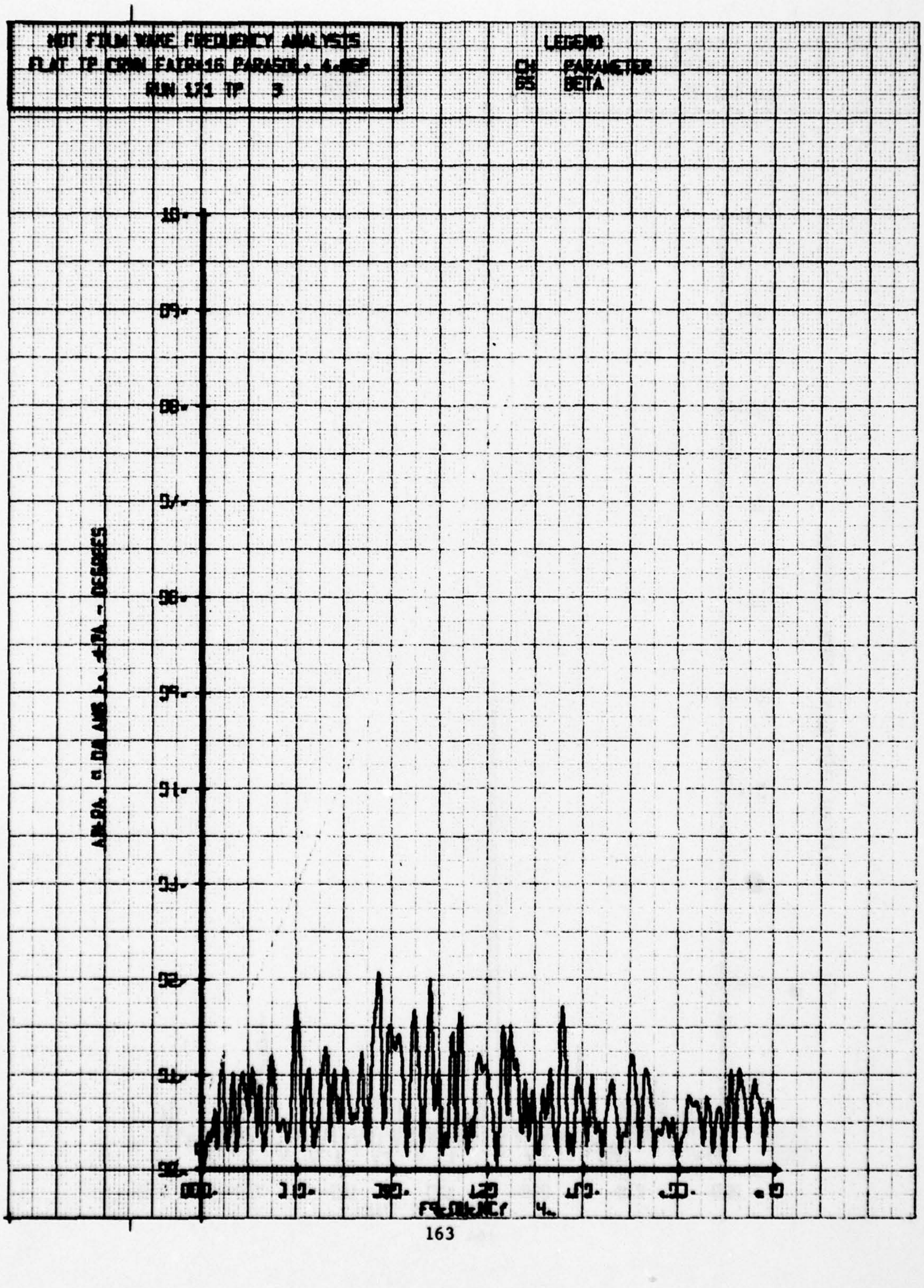
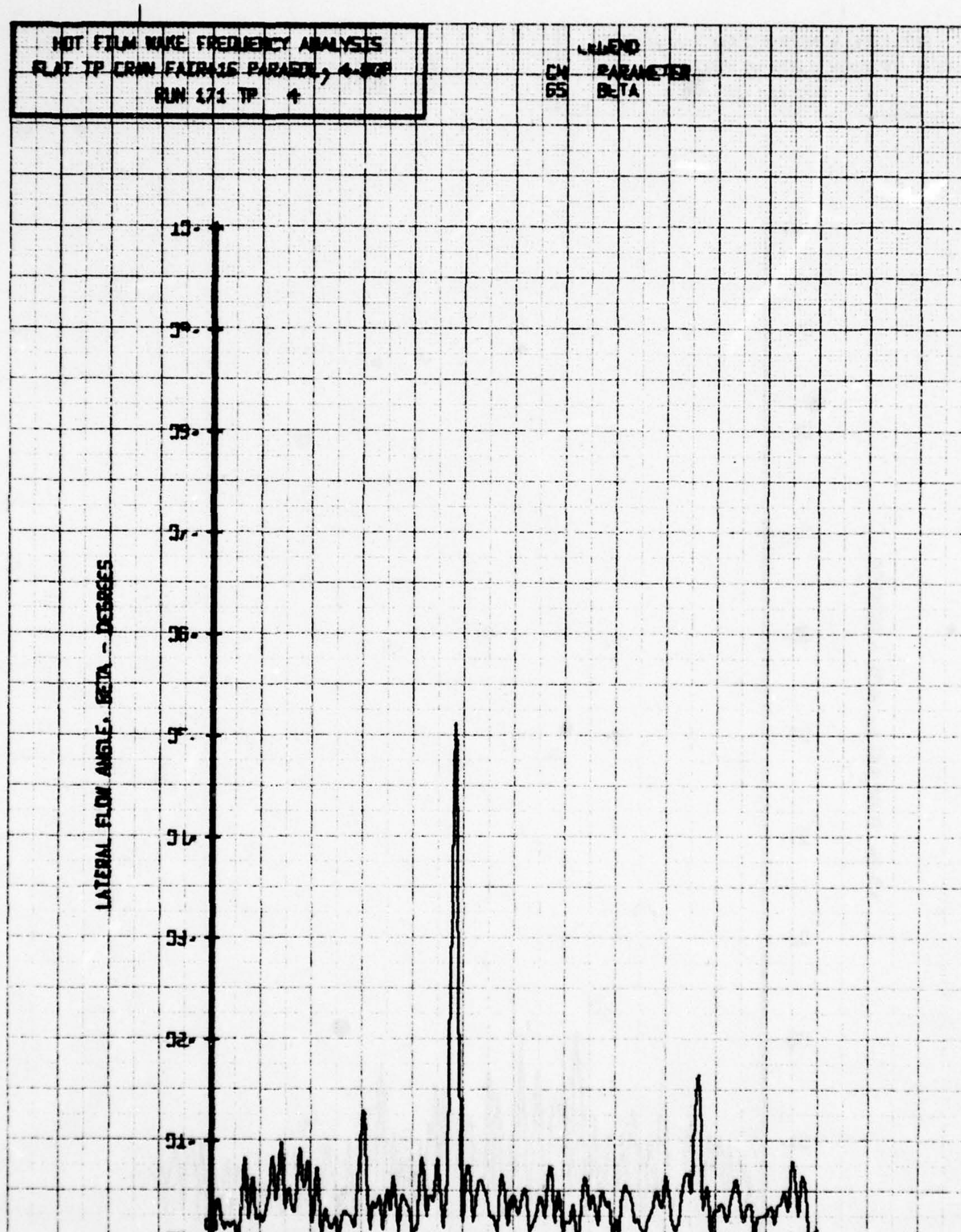
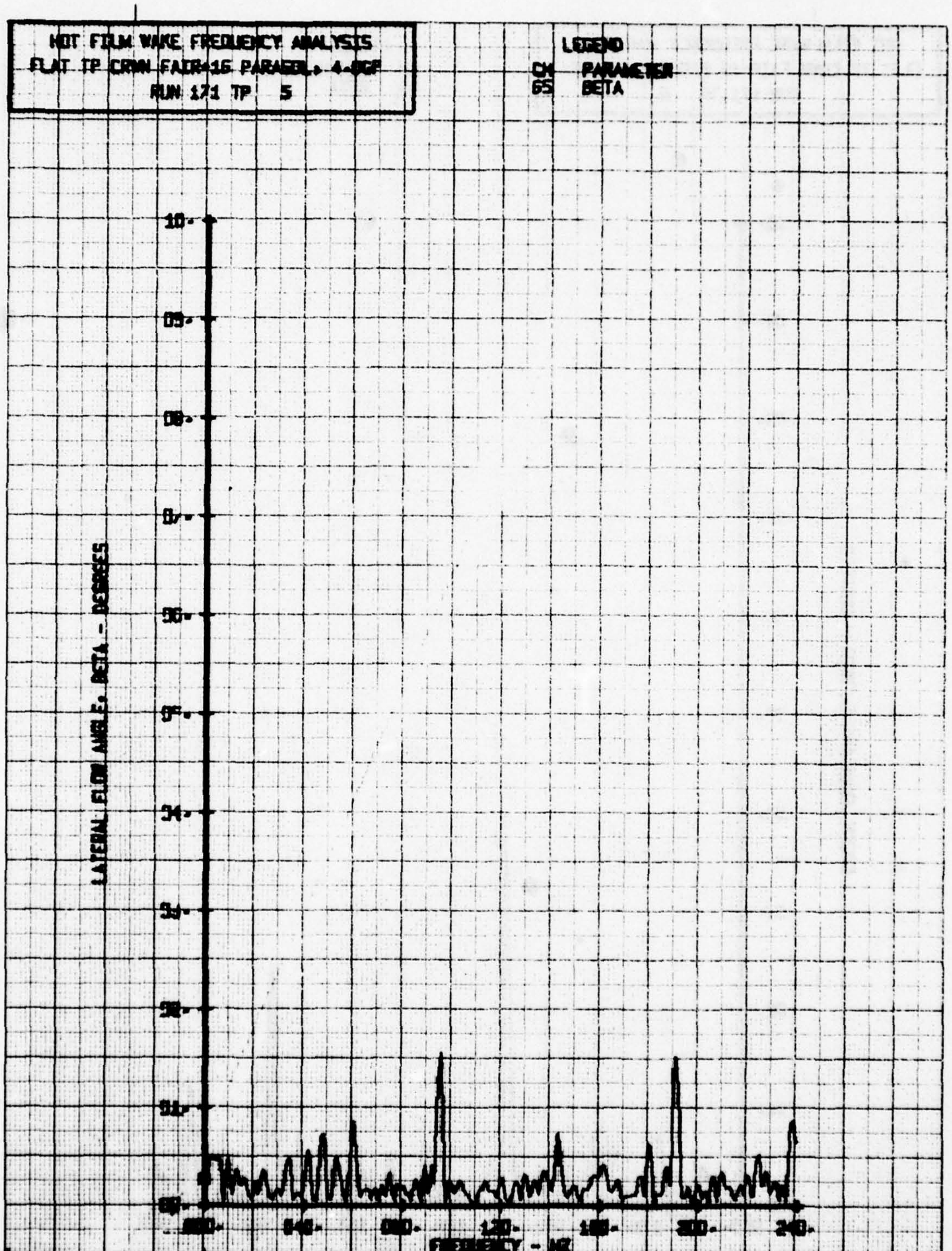
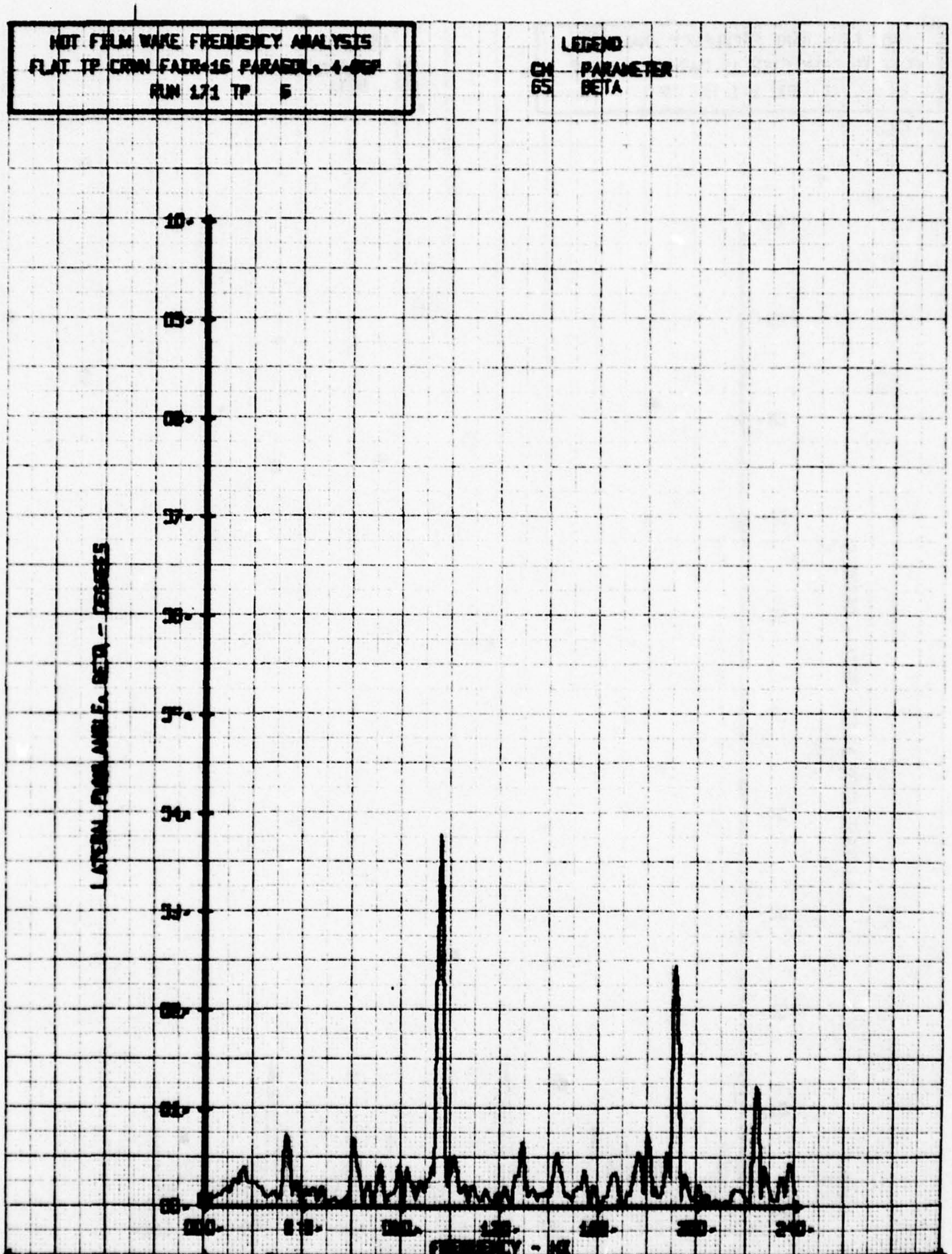
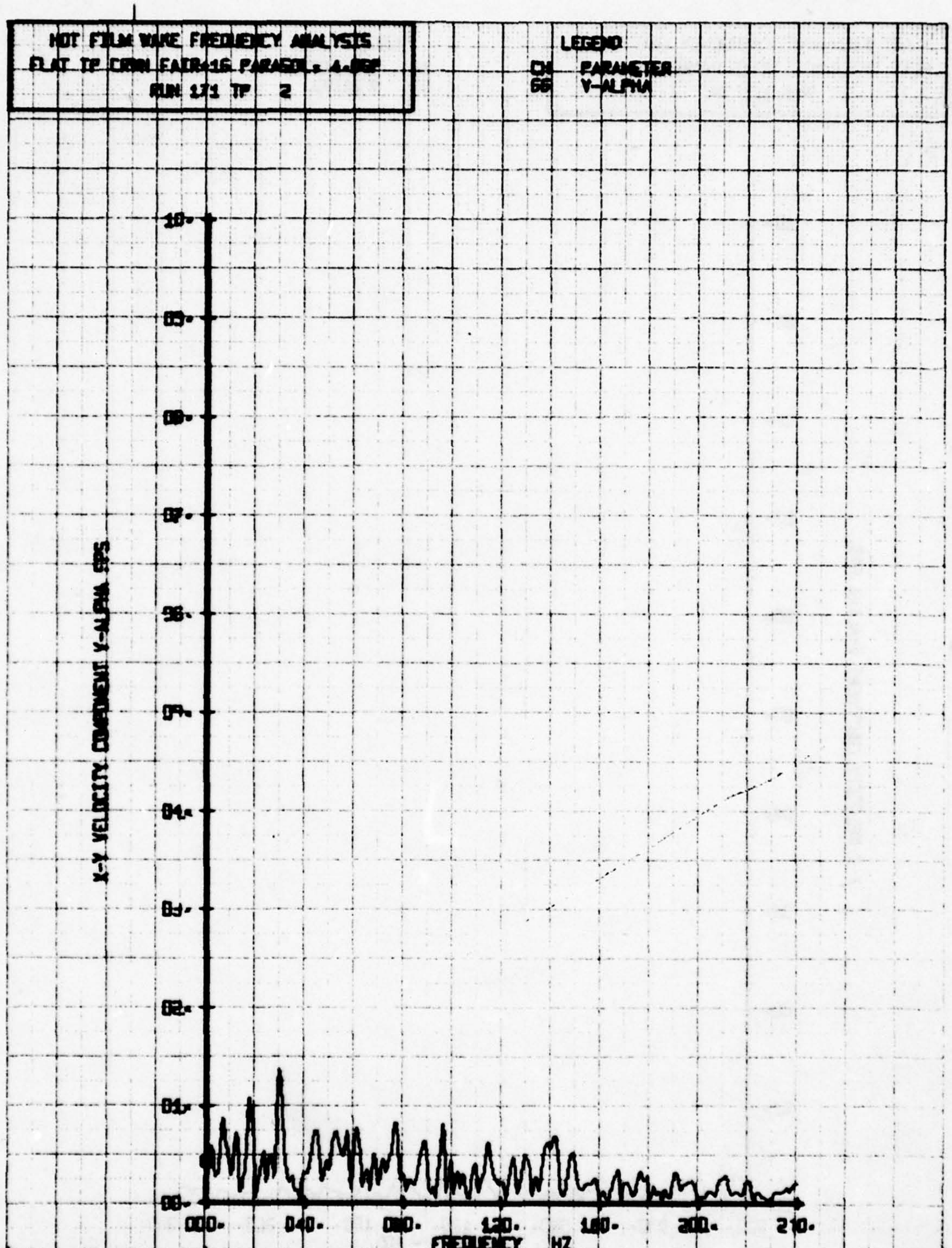
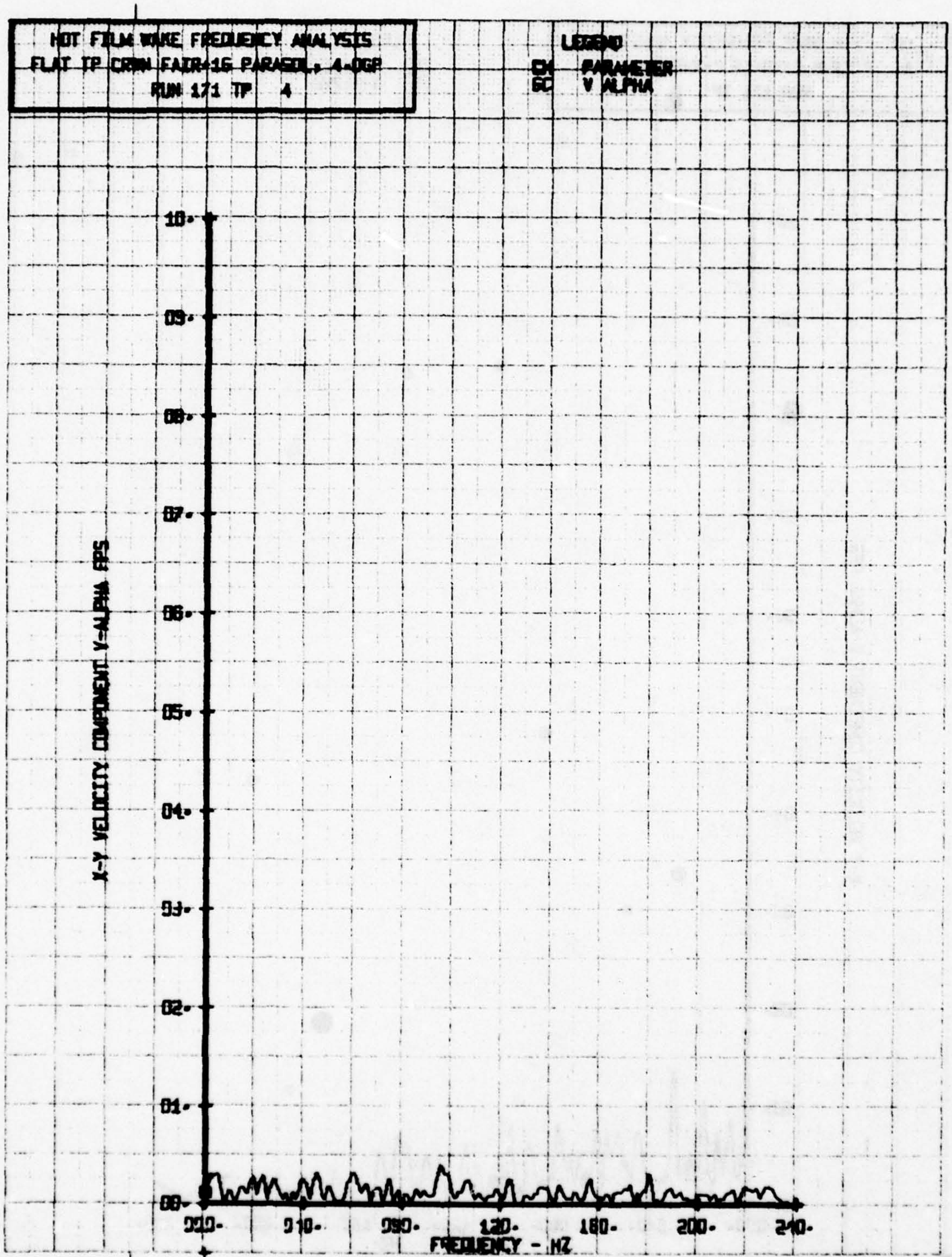

HOT FILM WAKE FREQUENCY ANALYSIS
RUN 171 TP 3
LEGEND
CH PARAMETER
65 BETA

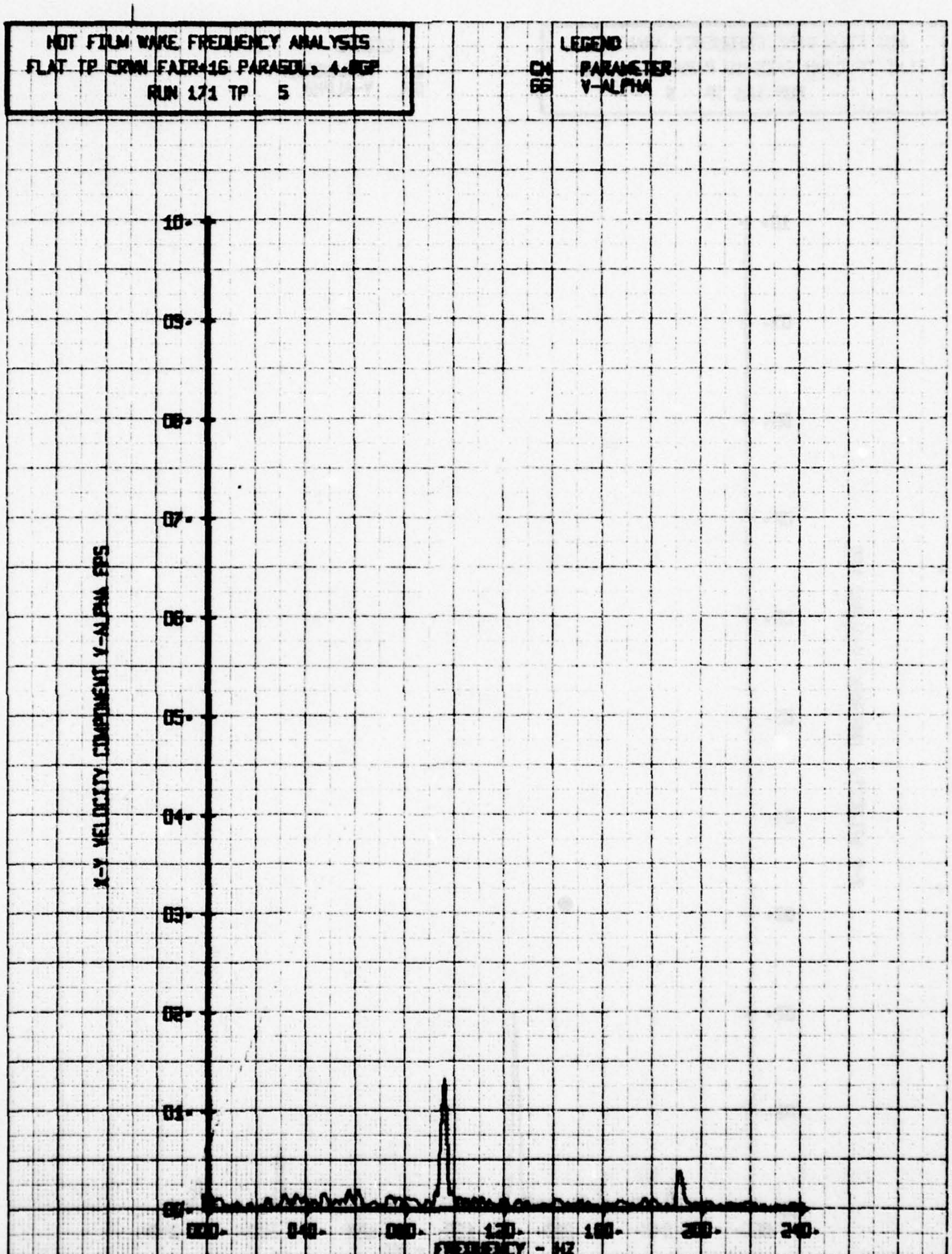

HOT FILM WAKE FREQUENCY ANALYSIS
FLAT TP CRMN FAIR416 PARASOL, 4-BCP
RUN 171 TP 4
LEGEND
CN PARAMETER
65 BETA
LATERAL FLOW ANGLE, BETA - DEGREES
FREQUENCY HZ


HOT FILM WAKE FREQUENCY ANALYSIS
RUN 171 TP 5
LEGEND
CM PARAMETER
65 BETA
LATERAL FLOW ANGLE, BETA - DEGREES
FREQUENCY - HZ


HOT FILM WAKE FREQUENCY ANALYSIS
RUN 171 TP 5
LEGEND
CH PARAMETER
65 BETA


HOT FILM WAKE FREQUENCY ANALYSIS
FLAT TP CRBN FAIR+16 PARASOL, 4.0GP
RUN 171 TP 2
LEGEND
CH PARAMETER
66 Y-ALPHA
X-Y VELOCITY COMPONENT Y-ALPHA SPS
FREQUENCY HZ


HOT FILM WAKE FREQUENCY ANALYSIS
FLAT TP CRWN FAIR+16 PARASOL, 4-OGP
RUN 171 TP 4
LEGEND
CH PARAMETER
6C V ALPHA
X-Y VELOCITY COMPONENT V-ALPHA FPS
FREQUENCY - HZ


HOT FILM WAKE FREQUENCY ANALYSIS
FLAT TP CRWN FAIR+16 PARASOL, 4-BGP
RUN 171 TP 5
LEGEND
CH PARAMETER
66 V-ALPHA
X-Y VELOCITY COMPONENT V-ALPHA FPS
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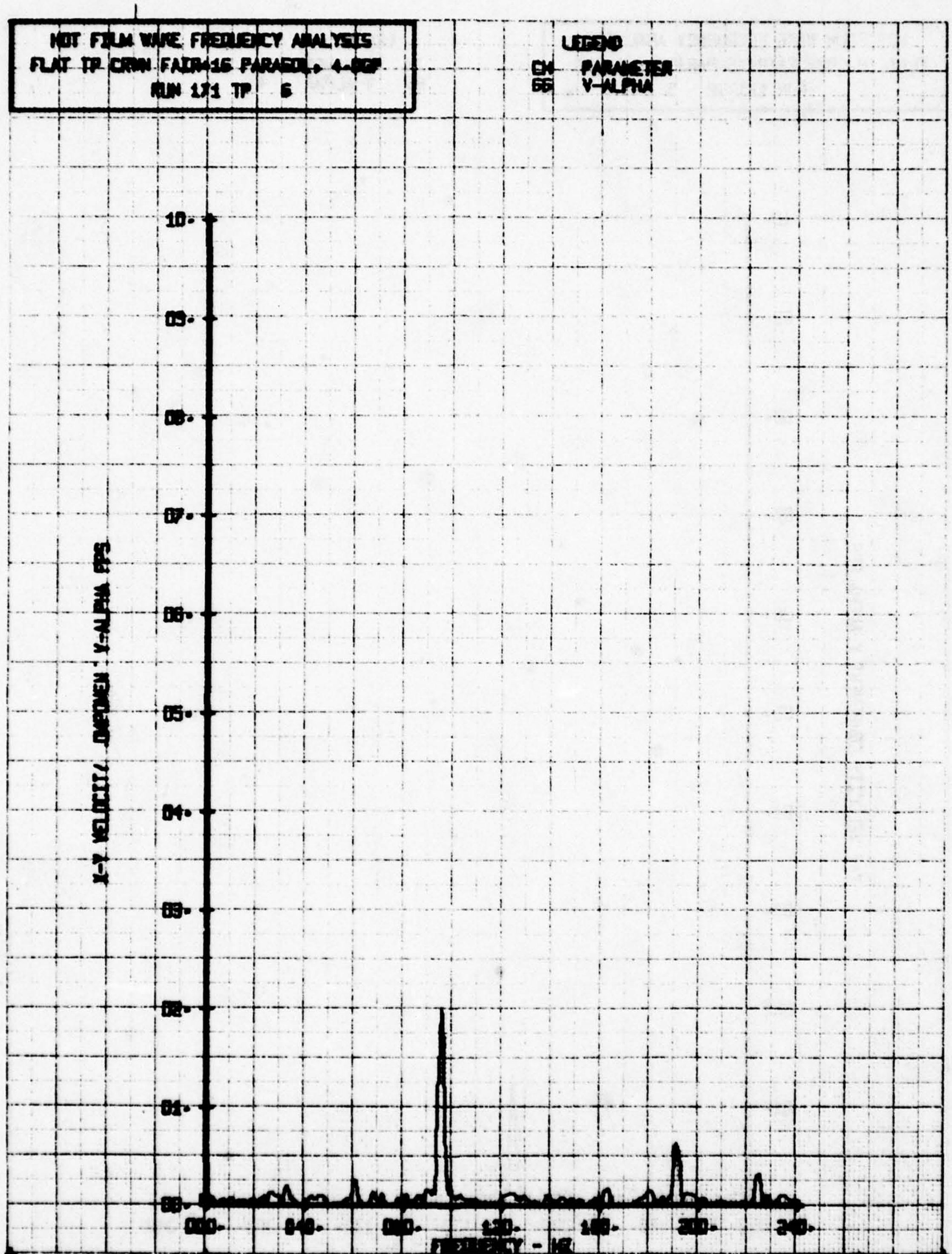
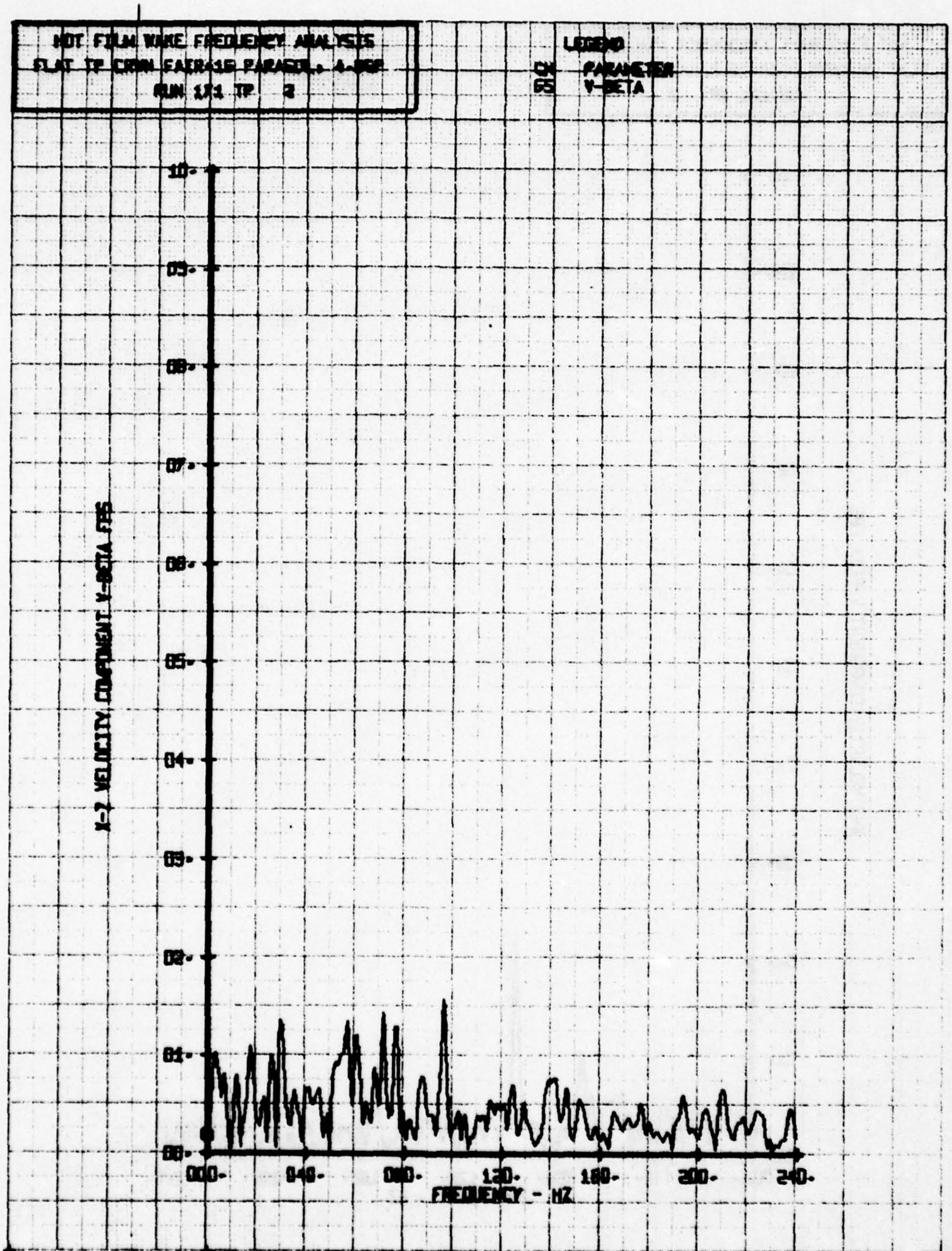
FREQUENCY - HZ


HOT FILM WAKE FREQUENCY ANALYSIS
FLAT TP CRWN FAIR416 PARAGOL. 4-BGF
RUN 171 TP 6
LEGEND
CH PARAMETER
66 V-ALPHA
X-Y VELOCITY COMPONENT V-ALPHA FPS
FREQUENCY - HZ



HOT FILM WAKE FREQUENCY ANALYSIS
LEGEND
CH PARAMETER
65 V-BETA
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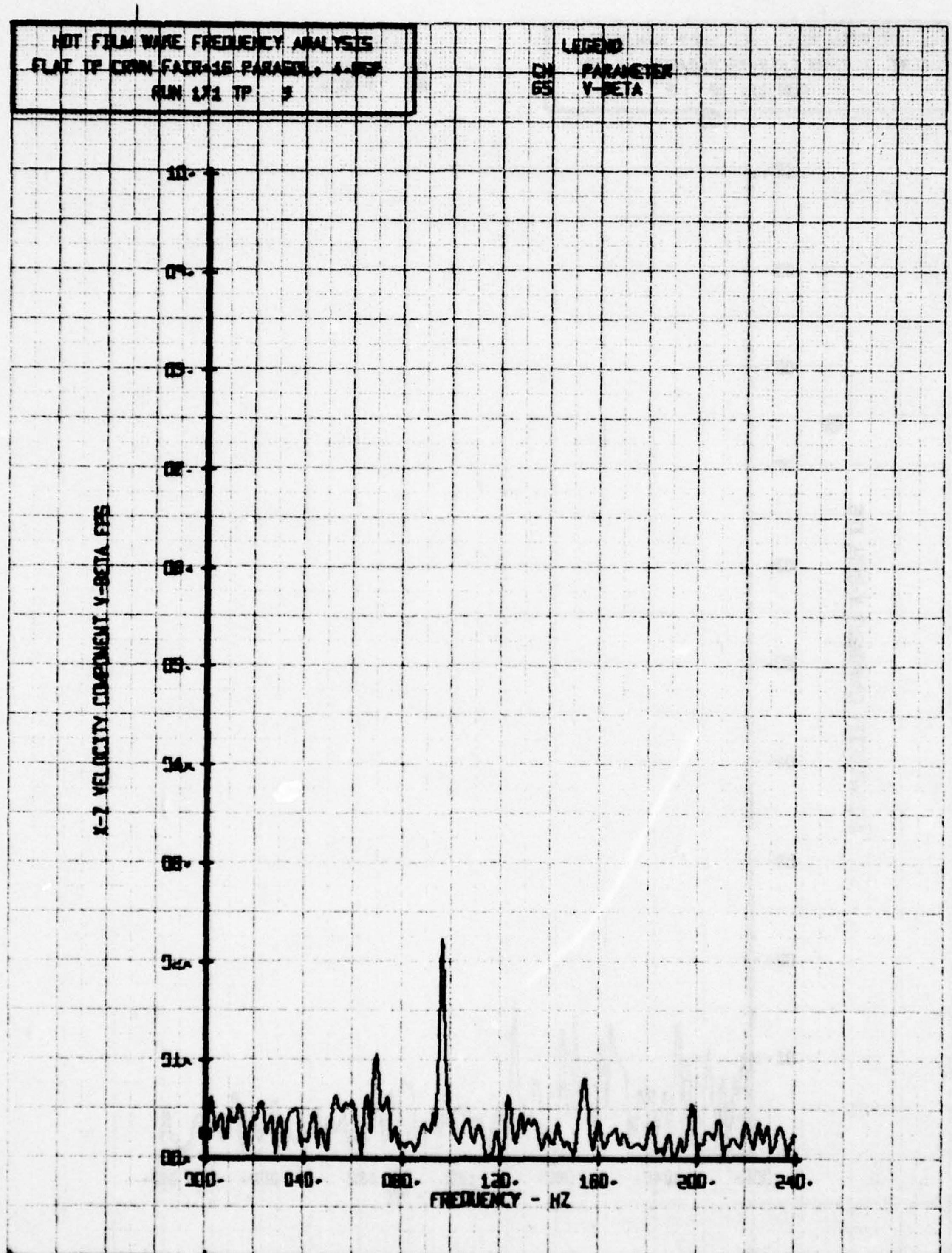
FREQUENCY - HZ



HOT FILM WAKE FREQUENCY ANALYSIS
FLAT TP CRWN FAIR+16 PARASOL, 4.0SF
RUN 1X1 TP 5
LEGEND
CH PARAMETER
65 V-BETA
X-Z VELOCITY COMPONENT V-BETA FPS
FREQUENCY - HZ
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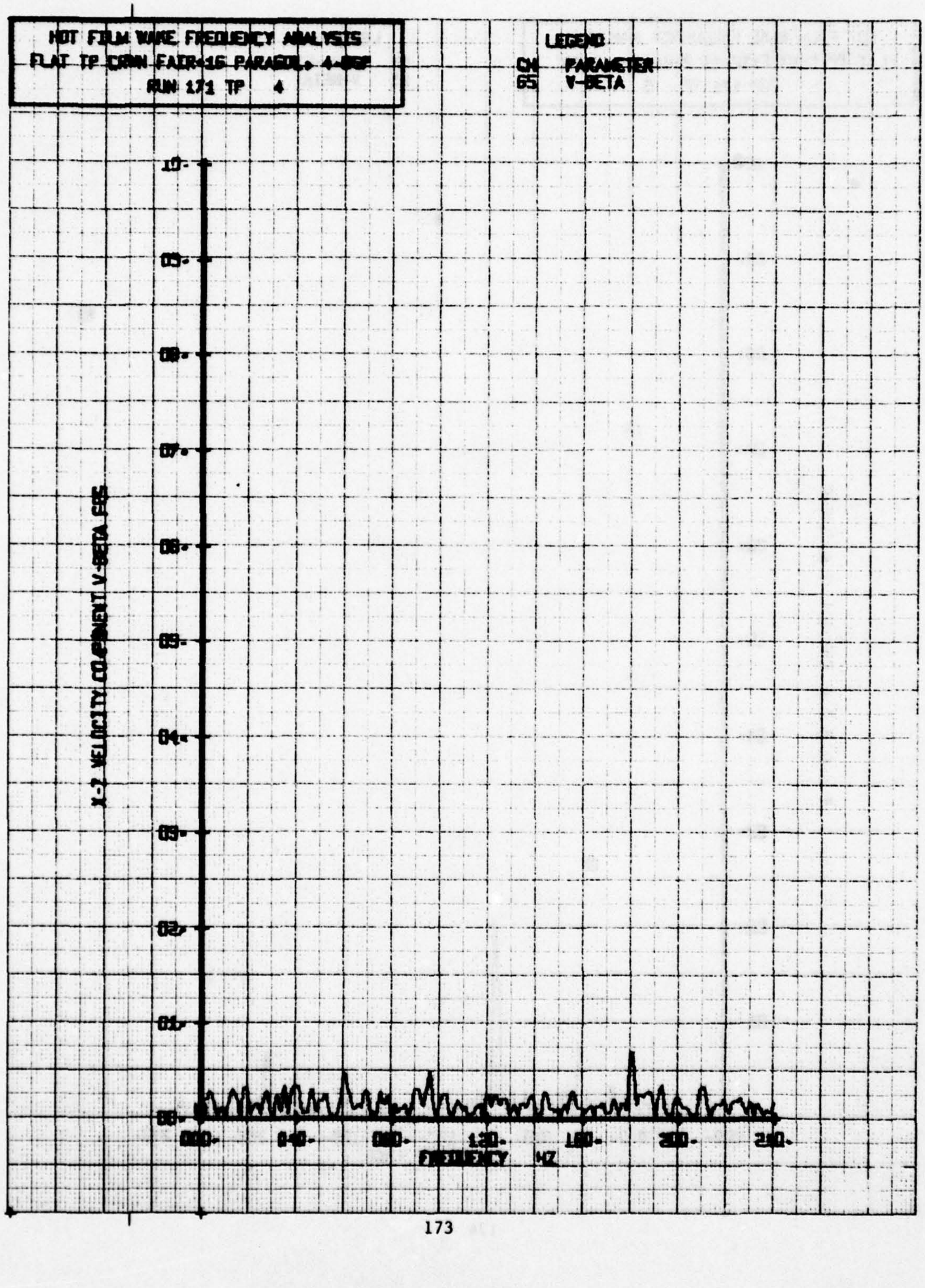
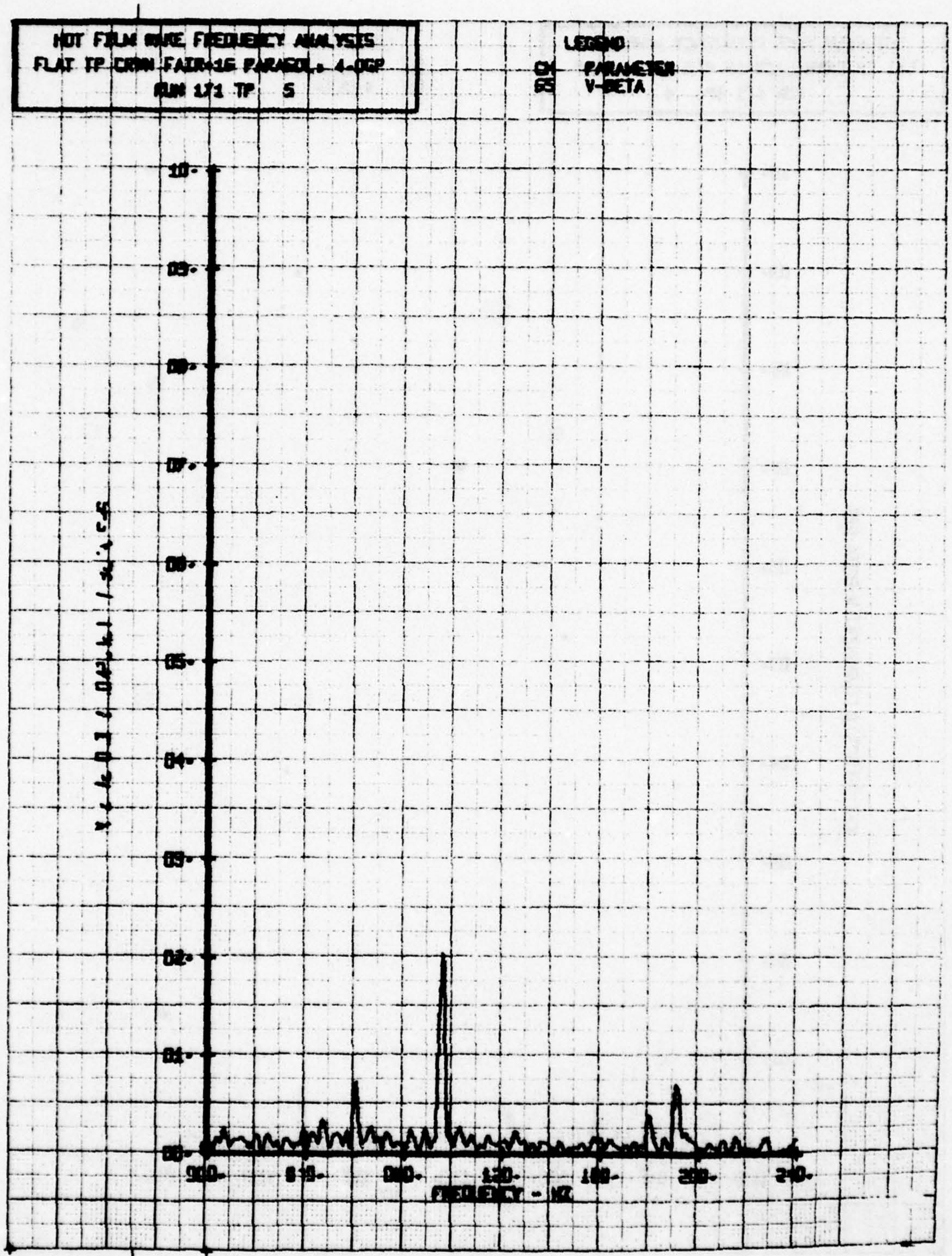
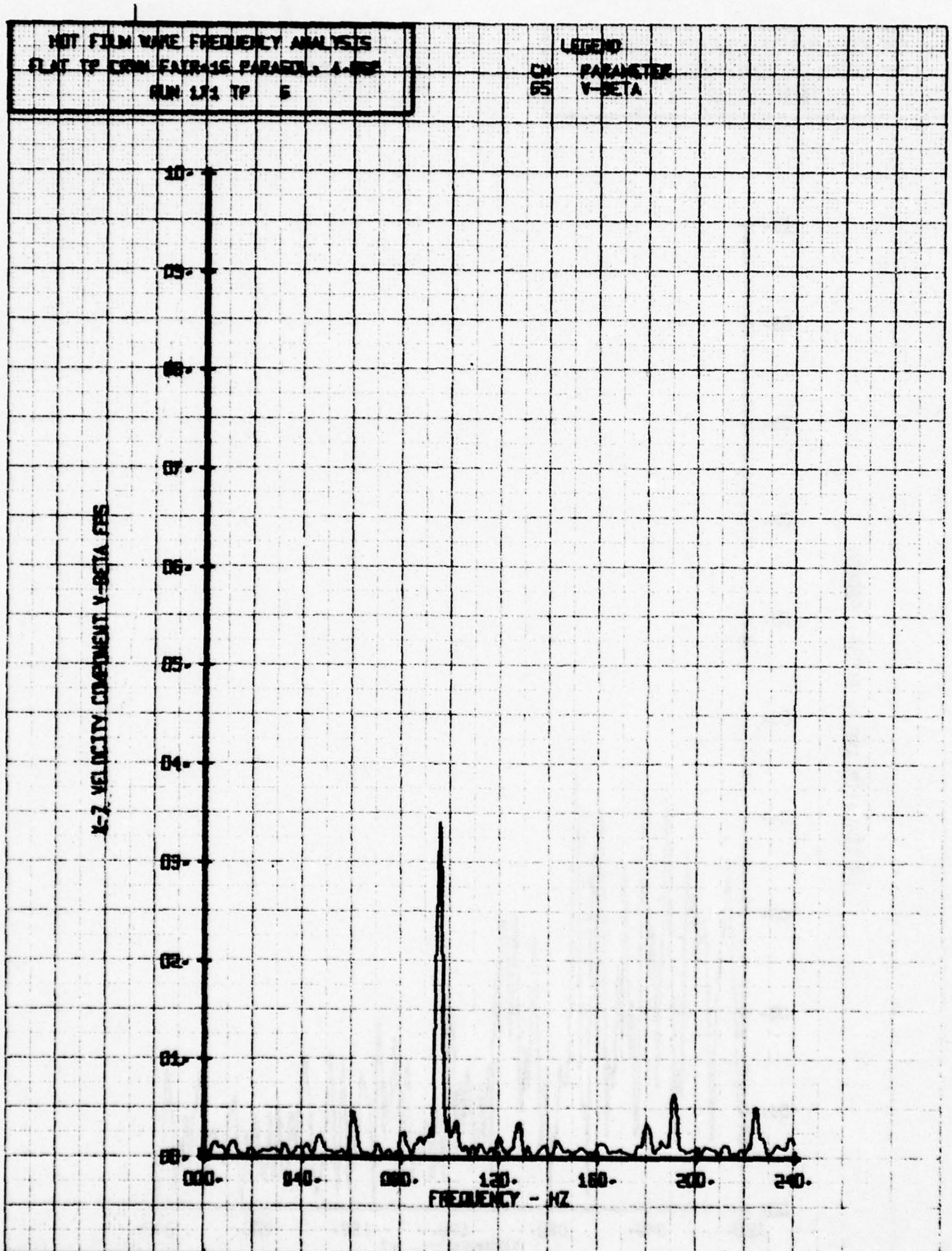

HOT FILM WAKE FREQUENCY ANALYSIS
FLAT TP CRWN FAIR-16 PARAGOL, 4-06F
RUN 171 TP 4
LEGEND
CH PARAMETER
65 V-BETA
X-Z VELOCITY COMPONENT V-BETA FBS
FREQUENCY HZ


HOT FILM WAVE FREQUENCY ANALYSIS
FLAT TP CRWN FAIR-16 PARAGOL, 4-OGP
RUN 171 TP 5
LEGEND
CH PARAMETER
65 V-BETA
FREQUENCY - HZ


HOT FILM WAKE FREQUENCY ANALYSIS
RUN 1?1 TP 5
LEGEND
CH PARAMETER
65 V-BETA
X-Z VELOCITY COMPONENT V-BETA FPS
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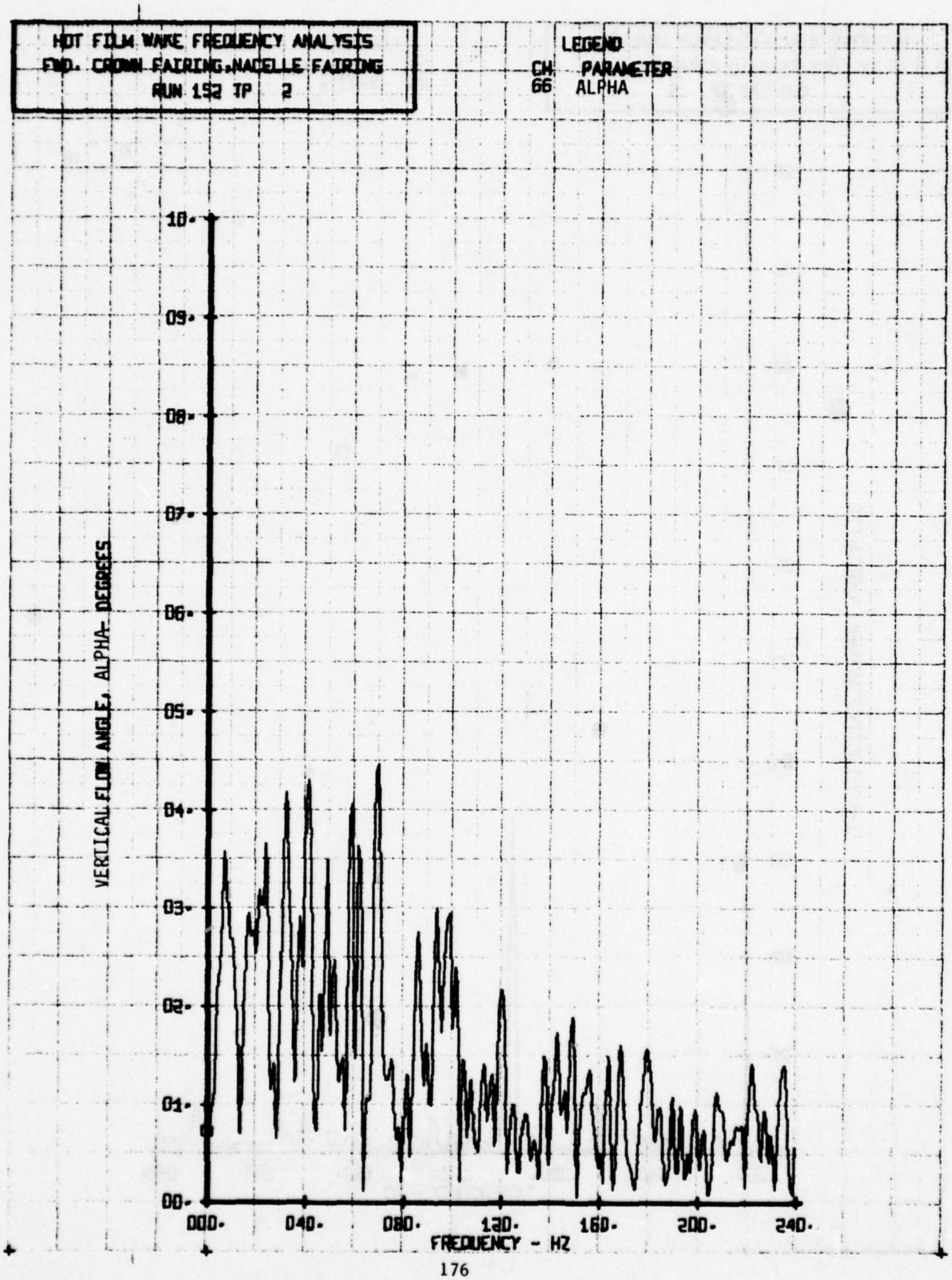
FREQUENCY - HZ



HOT FILM WAKE FREQUENCY ANALYSIS
FWD. CROWN FAIRING,NACELLE FAIRING
RUN 152 TP 2
LEGEND
CH PARAMETER
66 ALPHA
VERTICAL FLOW ANGLE, ALPHA- DEGREES
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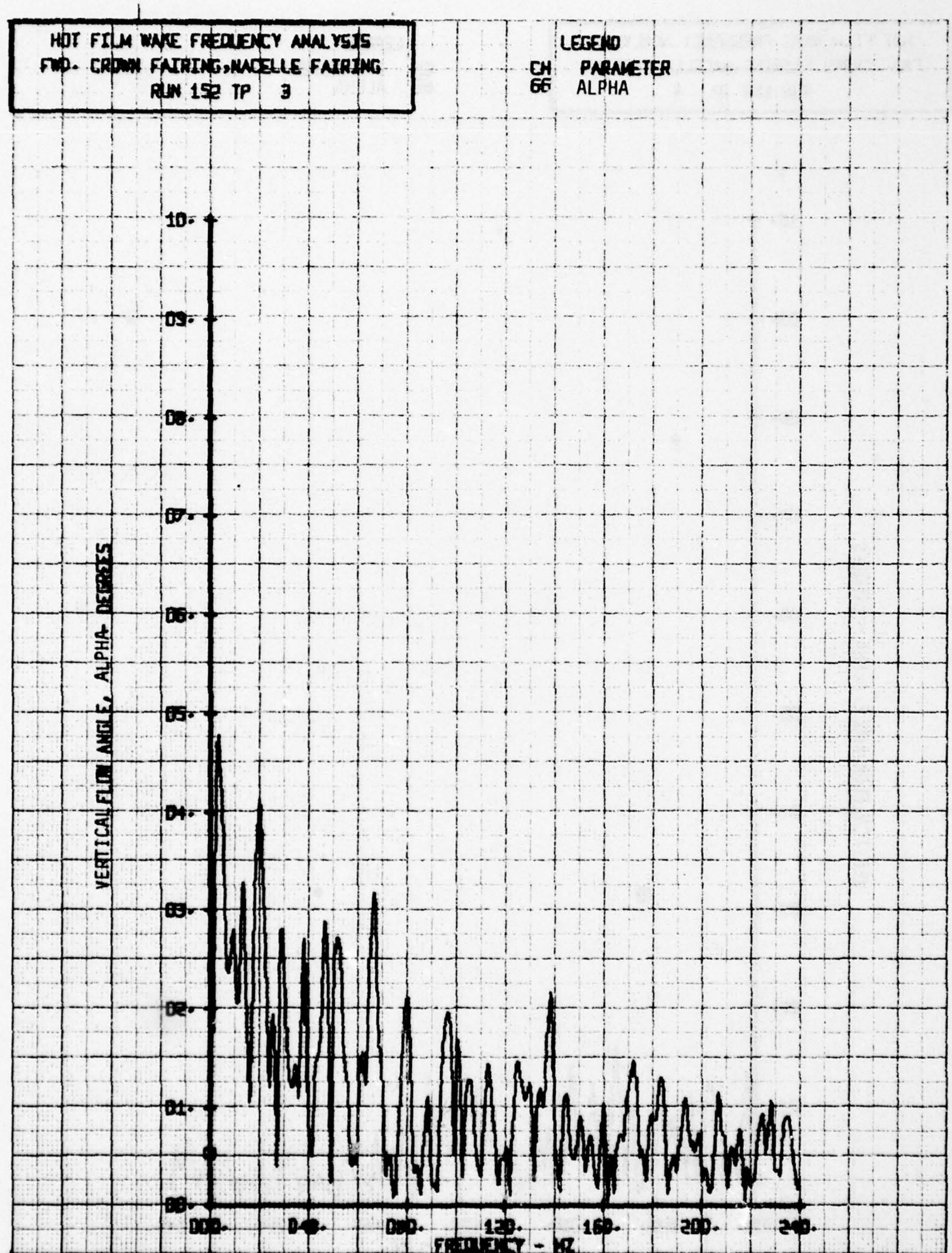
FREQUENCY - HZ


HOT FILM WAKE FREQUENCY ANALYSIS
FWD. CROWN FAIRING,NACELLE FAIRING
RUN 152 TP 3
LEGEND
CH PARAMETER
66 ALPHA
VERTICAL FLOW ANGLE, ALPHA- DEGREES
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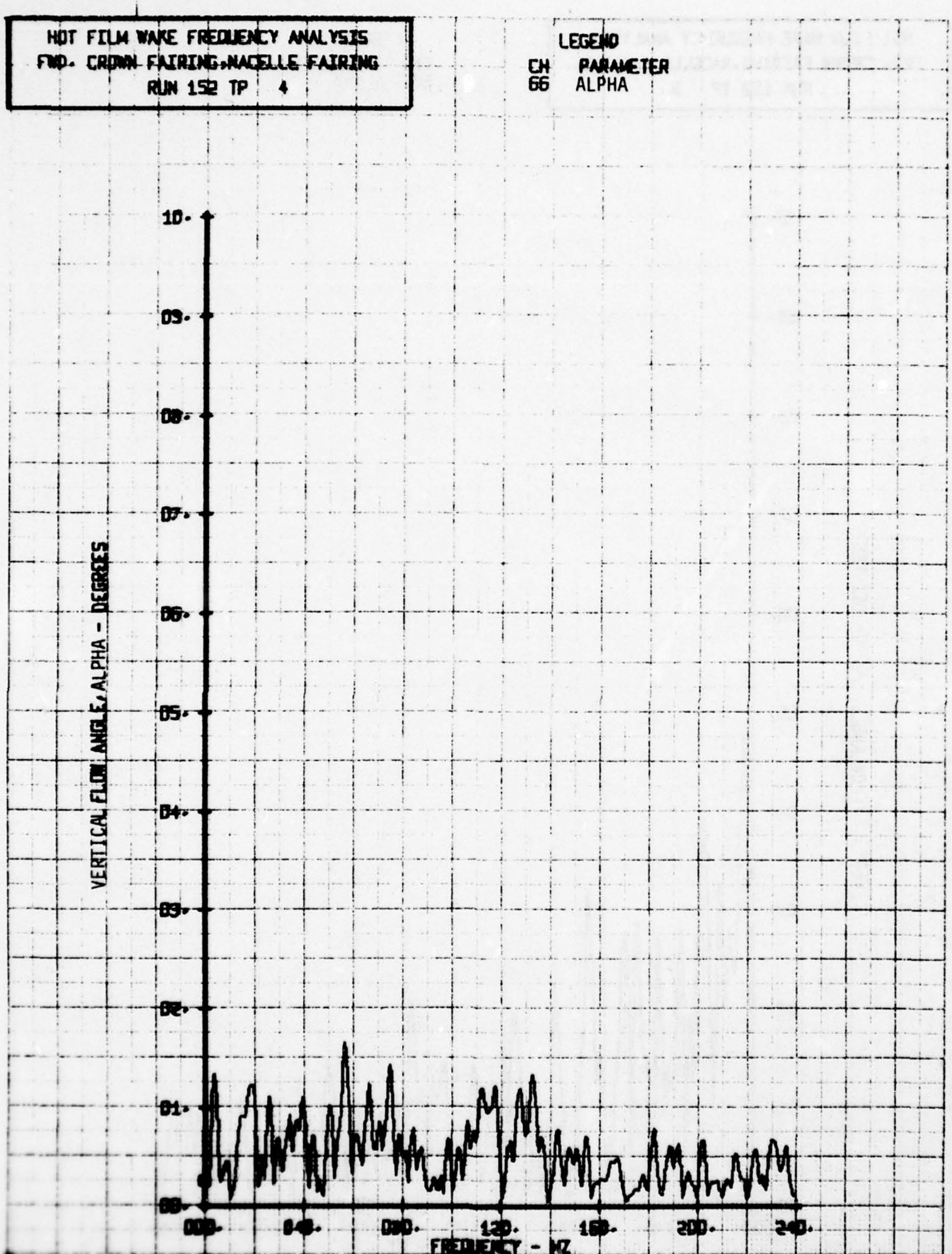
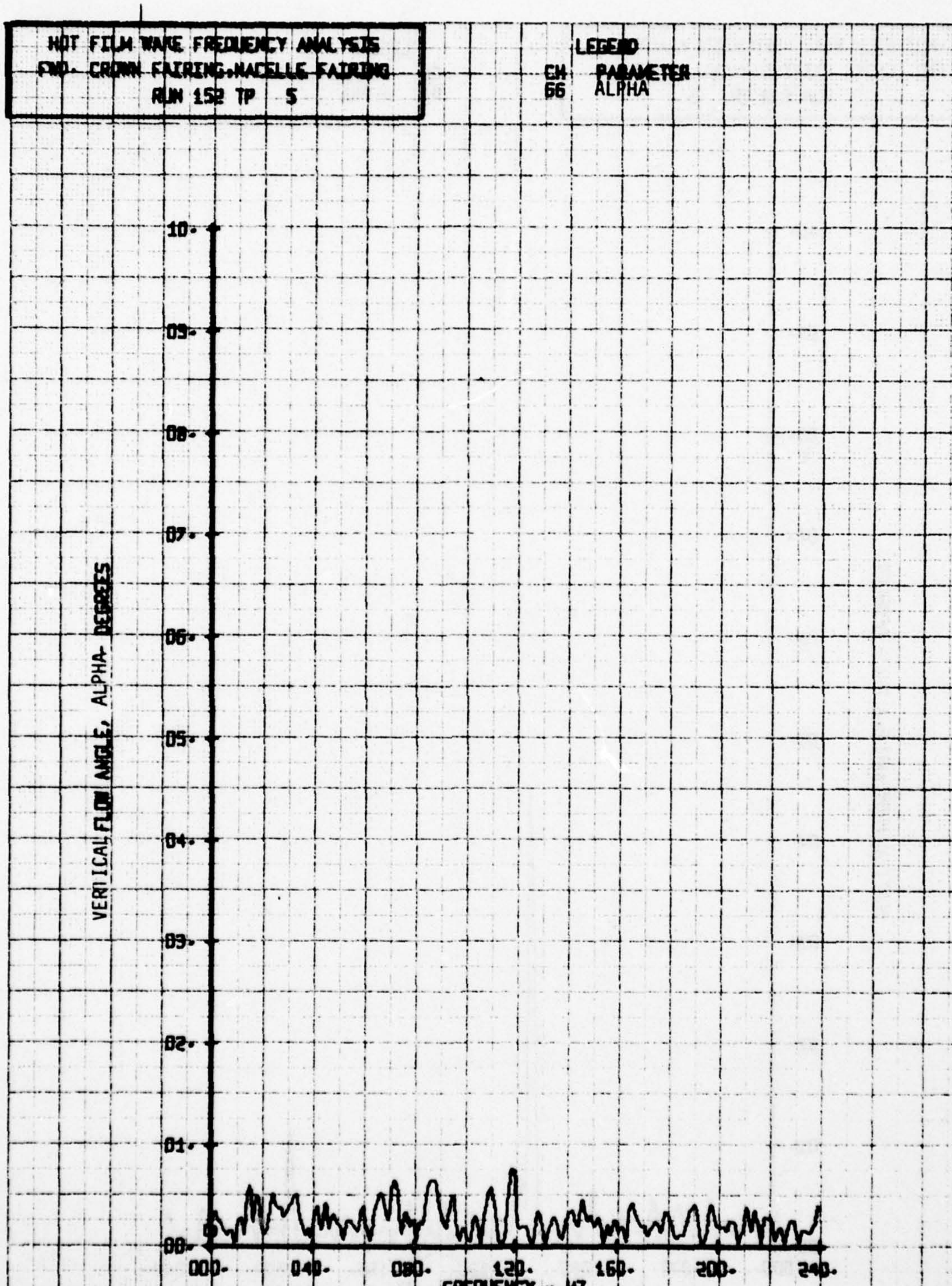
FREQUENCY - HZ



HOT FILM WAKE FREQUENCY ANALYSIS
FWD. CROWN FAIRING,NACELLE FAIRING
RUN 152 TP 4
LEGEND
CH PARAMETER
66 ALPHA
VERTICAL FLOW ANGLE, ALPHA - DEGREES
FREQUENCY - HZ



HOT FILM WAKE FREQUENCY ANALYSIS
FWD. CROWN FAIRING-NACELLE FAIRING
RUN 152 TP 5
LEGEND
CH PARAMETER
66 ALPHA
VERTICAL FLOW ANGLE, ALPHA- DEGREES
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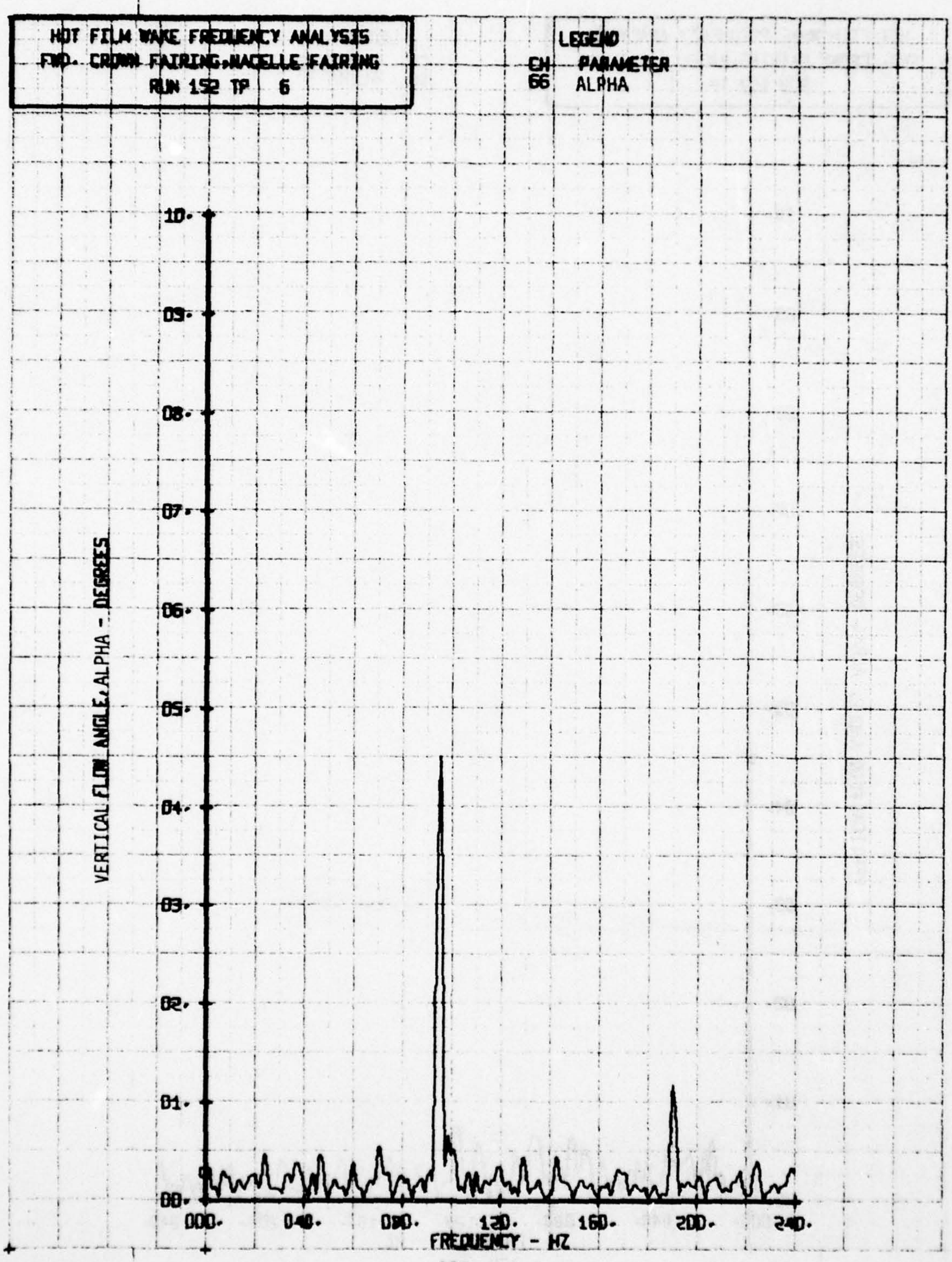
FREQUENCY - HZ


HOT FILM WAKE FREQUENCY ANALYSIS
FWD. CROWN FAIRING,NACELLE FAIRING
RUN 152 TP 6
LEGEND
CH PARAMETER
66 ALPHA
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VERTICAL FLOW ANGLE, ALPHA - DEGREES
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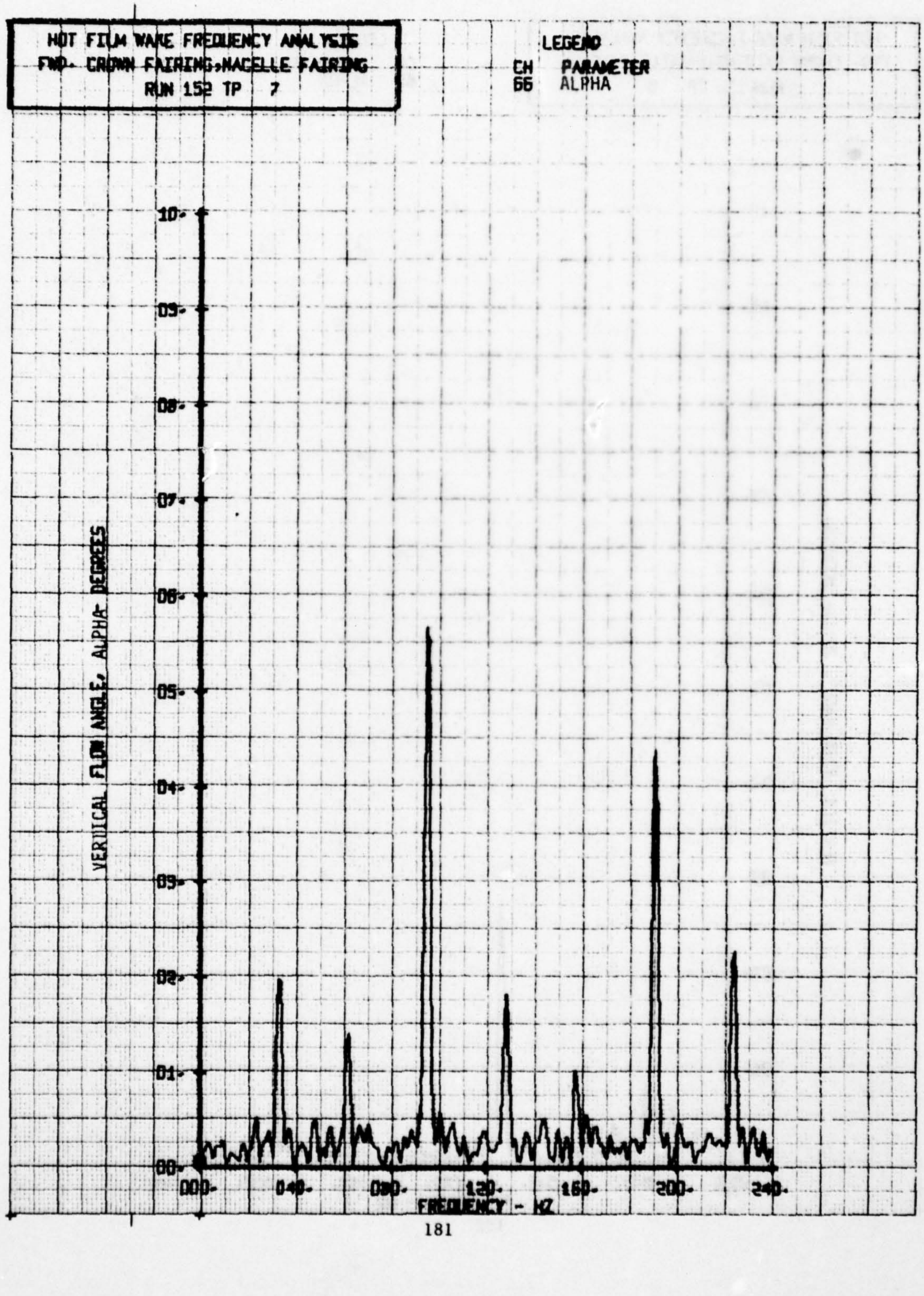
FREQUENCY - HZ


HOT FILM WAKE FREQUENCY ANALYSIS
FWD- CROWN FAIRING,NACELLE FAIRING
RUN 152 TP 7
LEGEND
CH PARAMETER
66 ALPHA
VERTICAL FLOW ANGLE, ALPHA- DEGREES
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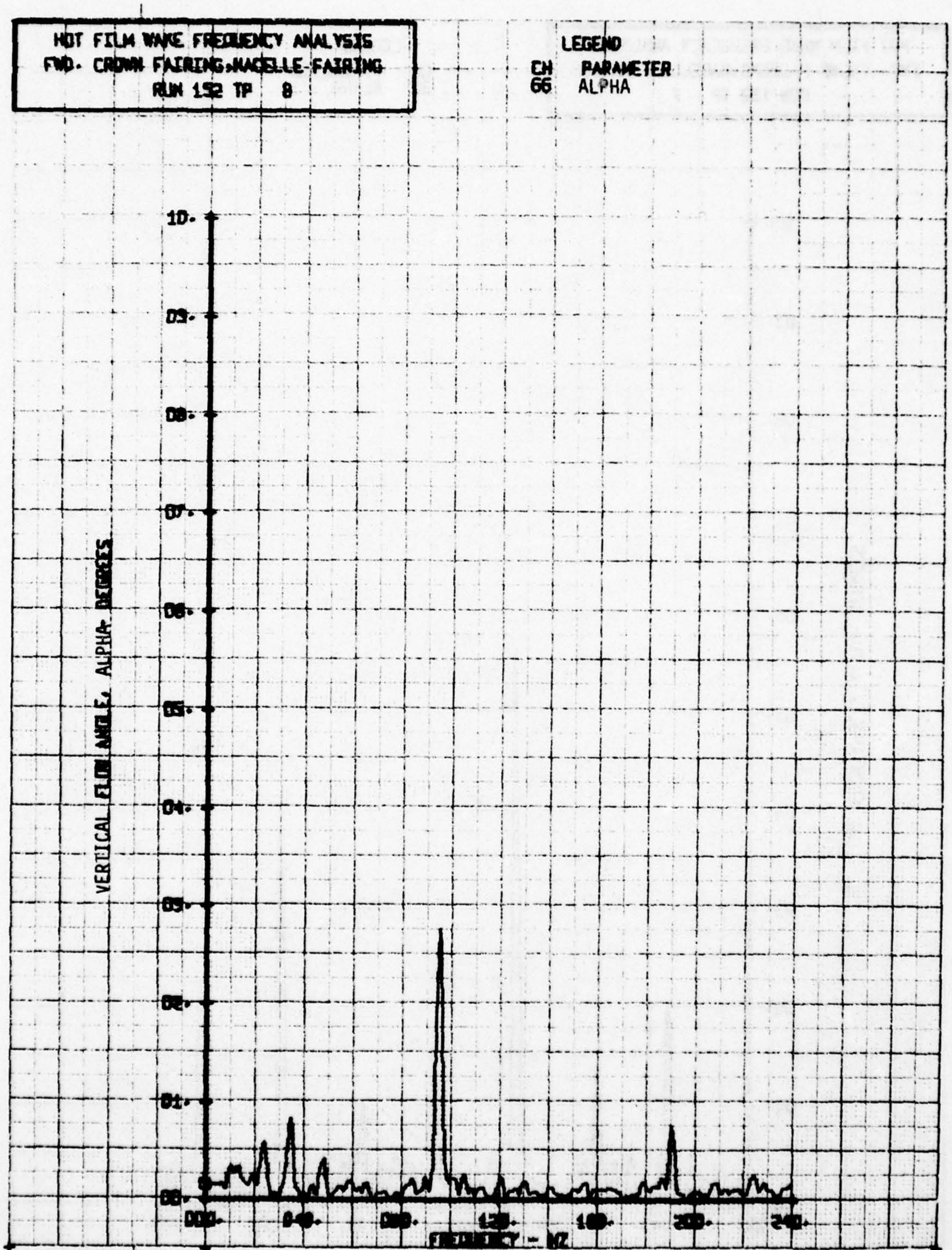
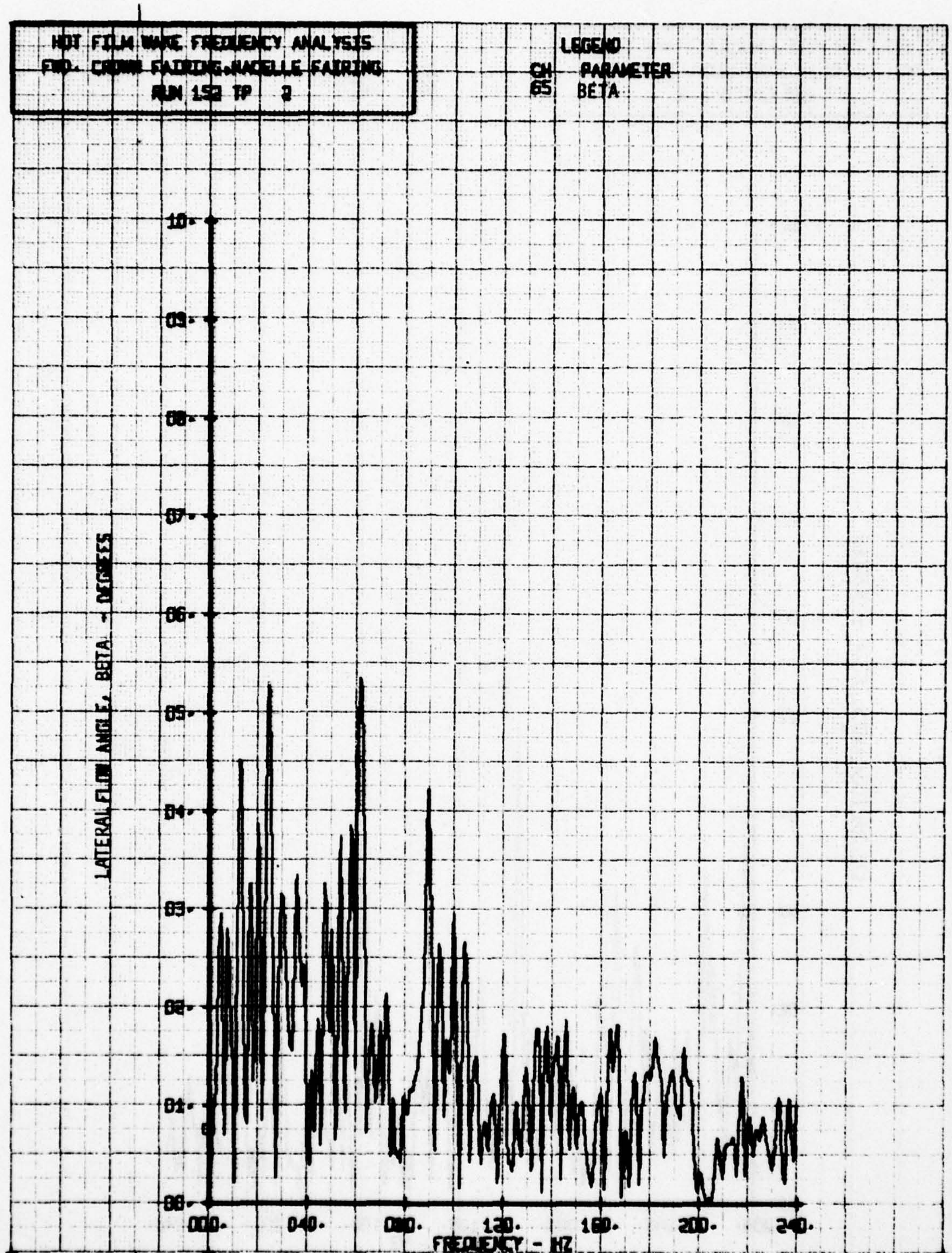
FREQUENCY - HZ


HOT FILM WAKE FREQUENCY ANALYSIS
FWD. CROWN FAIRING;NACELLE-FAIRING
RUN 152 TP 8
LEGEND
CH PARAMETER
66 ALPHA
VERTICAL FLOW ANGLE, ALPHA-DEGREES
FREQUENCY - HZ


HOT FILM WAKE FREQUENCY ANALYSIS
FWD. CROWN FAIRING,NACELLE FAIRING
RUN 152 TP 2
LEGEND
CH PARAMETER
65 BETA
LATERAL FLOW ANGLE, BETA - DEGREES
FREQUENCY - HZ
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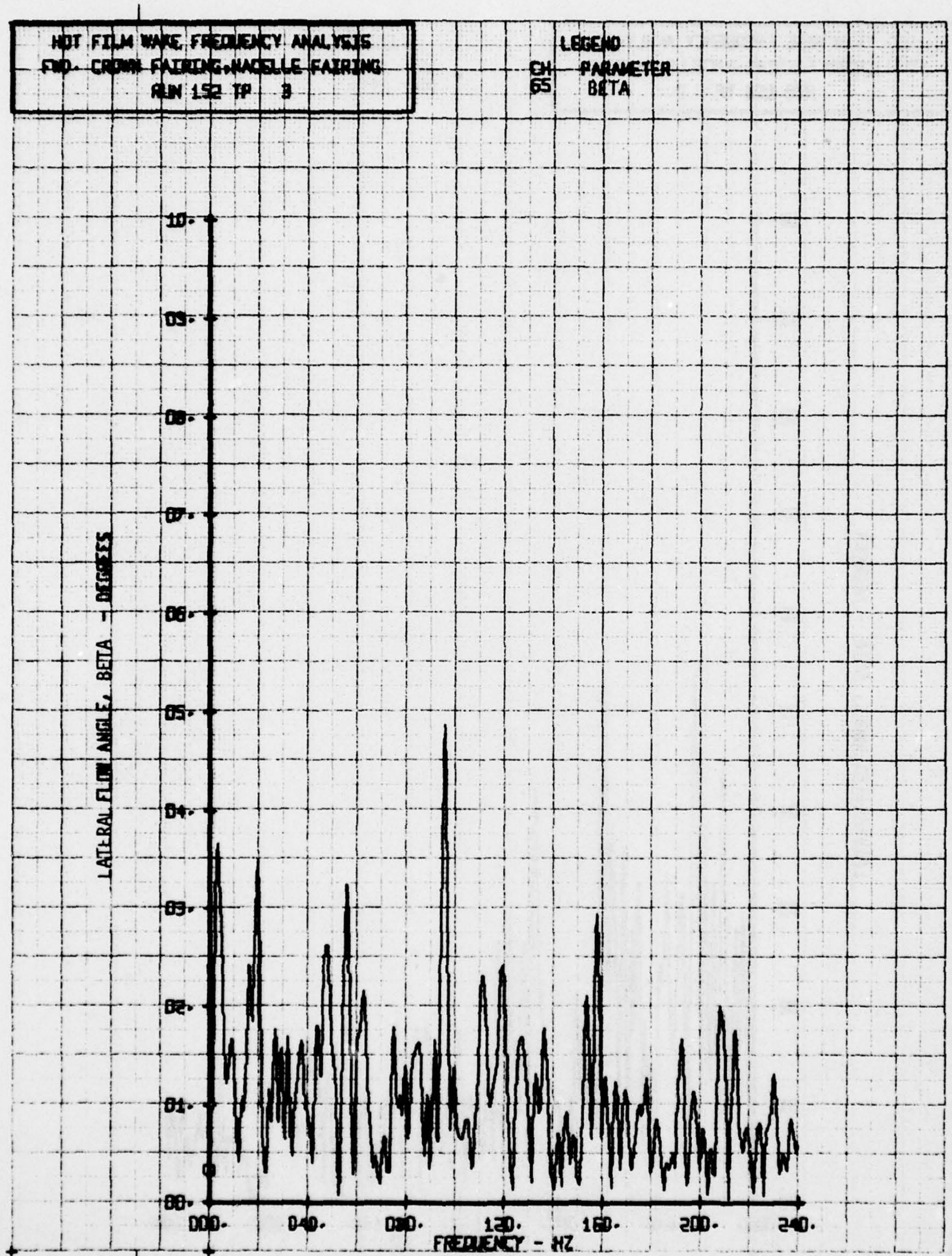
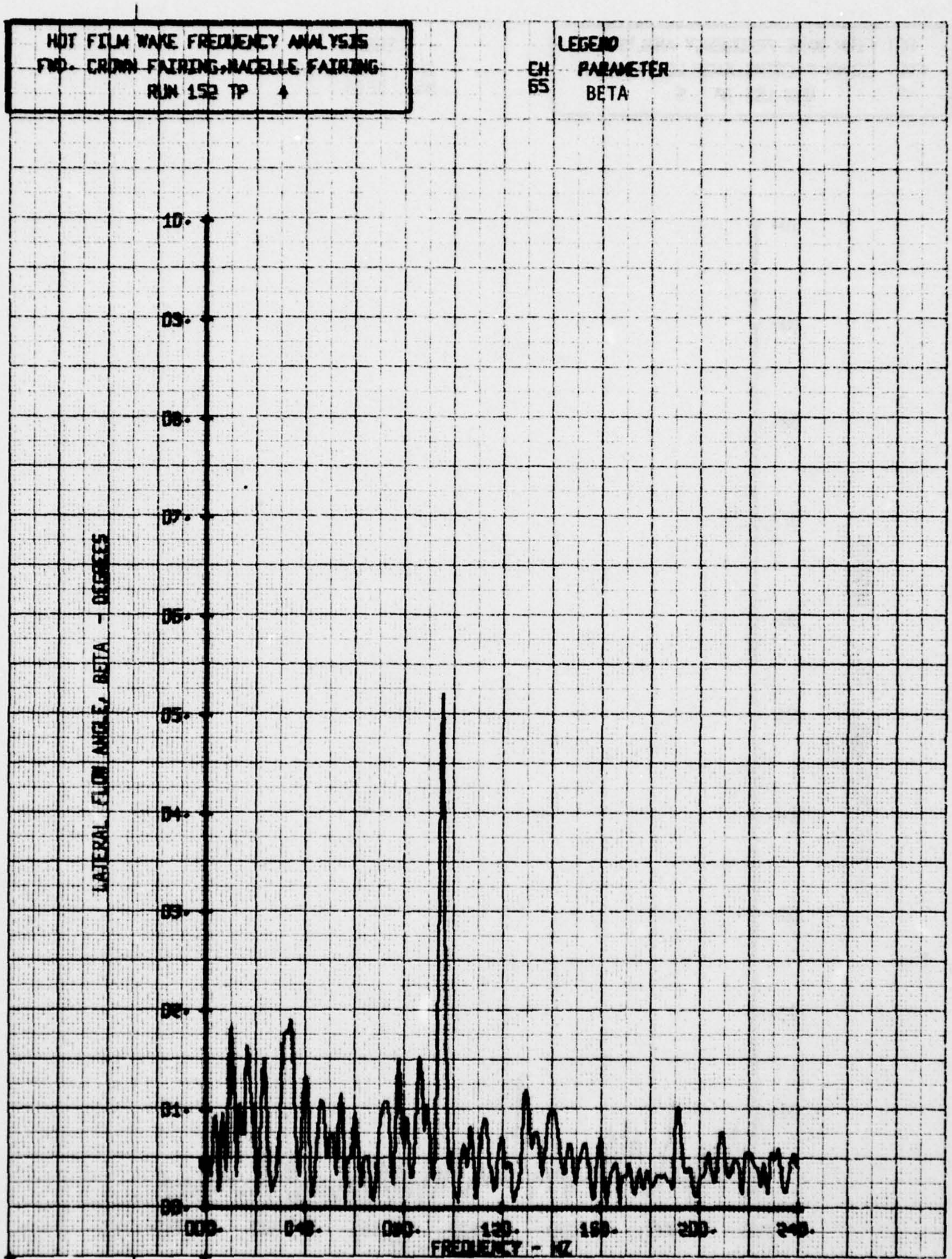
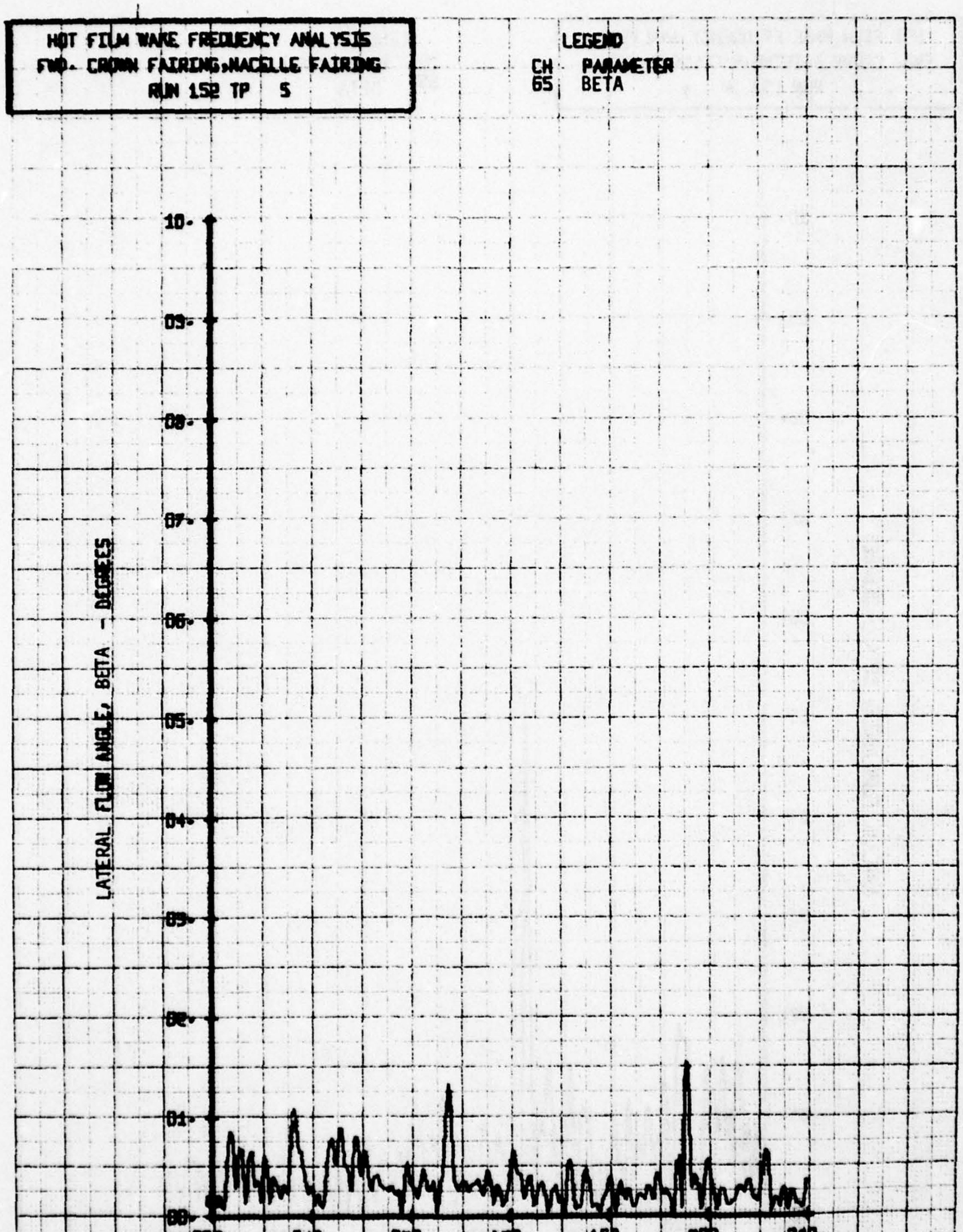
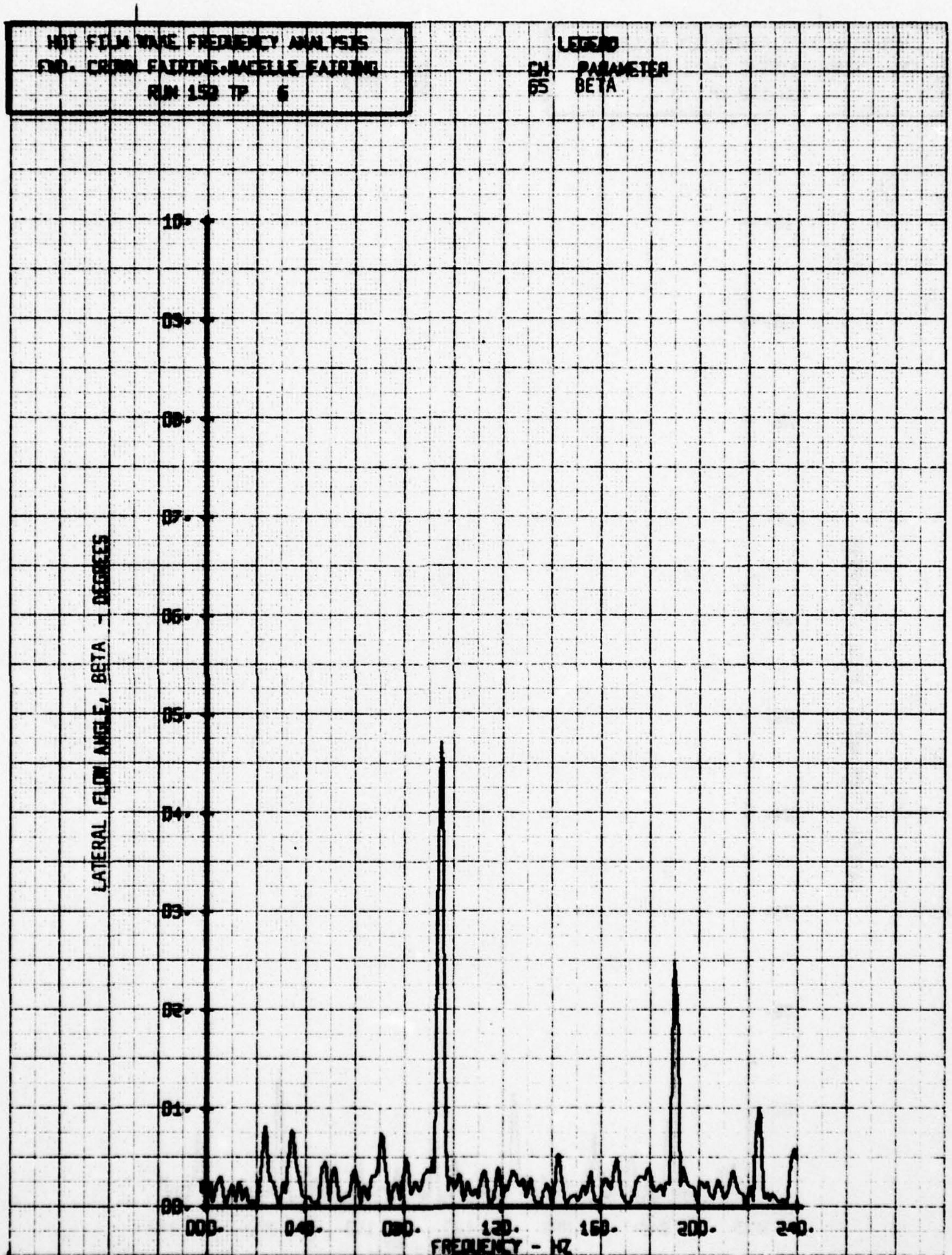

HOT FILM WAKE FREQUENCY ANALYSIS
FWD. CROWN FAIRING,NACELLE FAIRING
RUN 152 TP 3
LEGEND
CH PARAMETER
65 BETA
LATERAL FLOW ANGLE, BETA - DEGREES
FREQUENCY - HZ


HOT FILM WAKE FREQUENCY ANALYSIS
FWD. CROWN FAIRING,NACELLE FAIRING
RUN 152 TP 4
LEGEND
CH PARAMETER
65 BETA
LATERAL FLOW ANGLE, BETA - DEGREES
FREQUENCY - HZ


HOT FILM WAKE FREQUENCY ANALYSIS
FWD. CROWN FAIRING,NACELLE FAIRING
RUN 152 TP 5
LEGEND
CH PARAMETER
65 BETA
LATERAL FLOW ANGLE, BETA - DEGREES
FREQUENCY - HZ


HOT FILM WAKE FREQUENCY ANALYSIS
FWD. CROWN FAIRING.NACELLE FAIRING
RUN 159 TP 6
LEGEND
CH PARAMETER
65 BETA
LATERAL FLOW ANGLE, BETA - DEGREES
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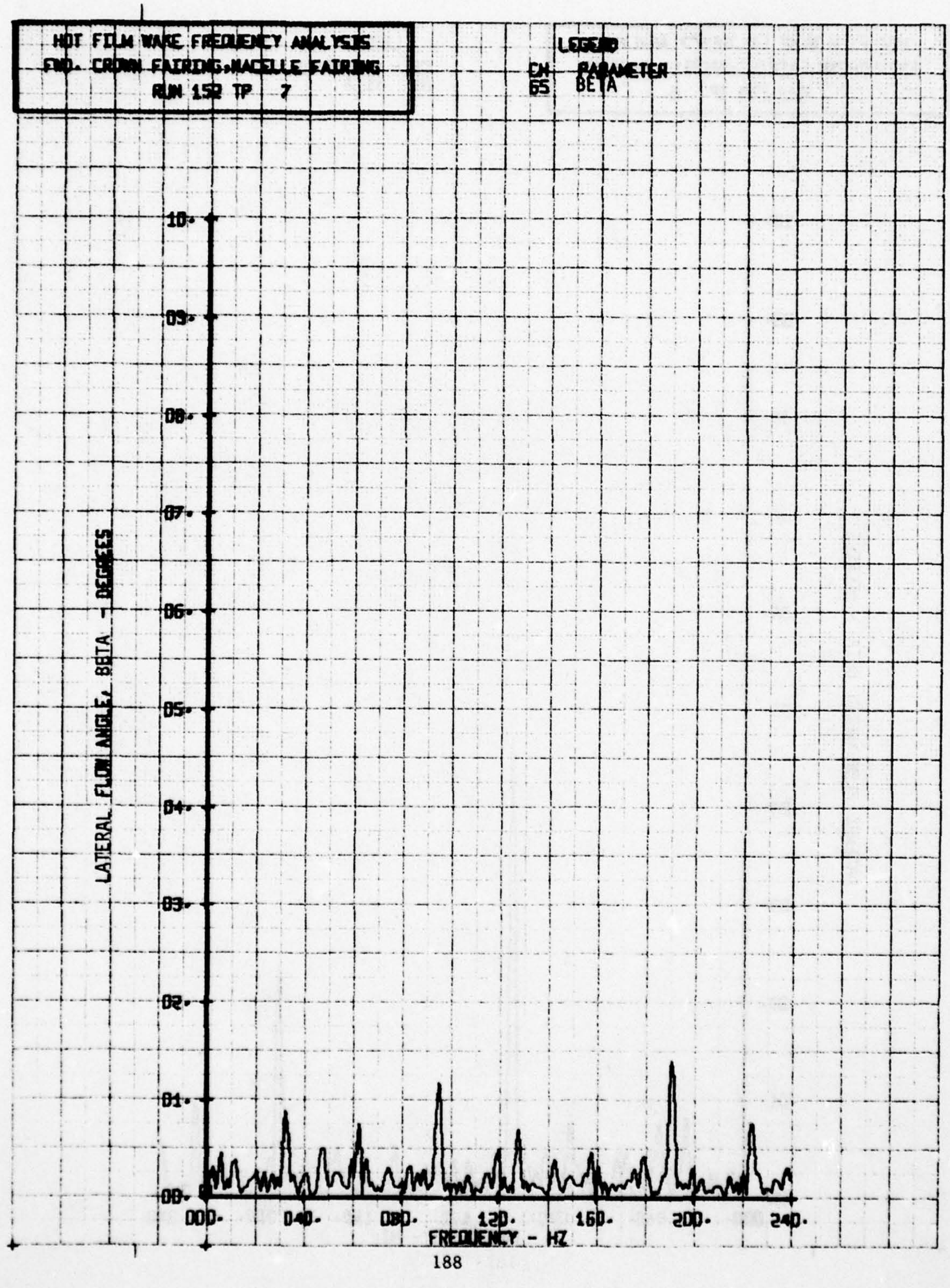
FREQUENCY - HZ


HOT FILM WAKE FREQUENCY ANALYSIS
FWD. CROWN FAIRING,NACELLE FAIRING
RUN 152 TP 7
LEGEND
CH PARAMETER
65 BETA
LATERAL FLOW ANGLE, BETA - DEGREES
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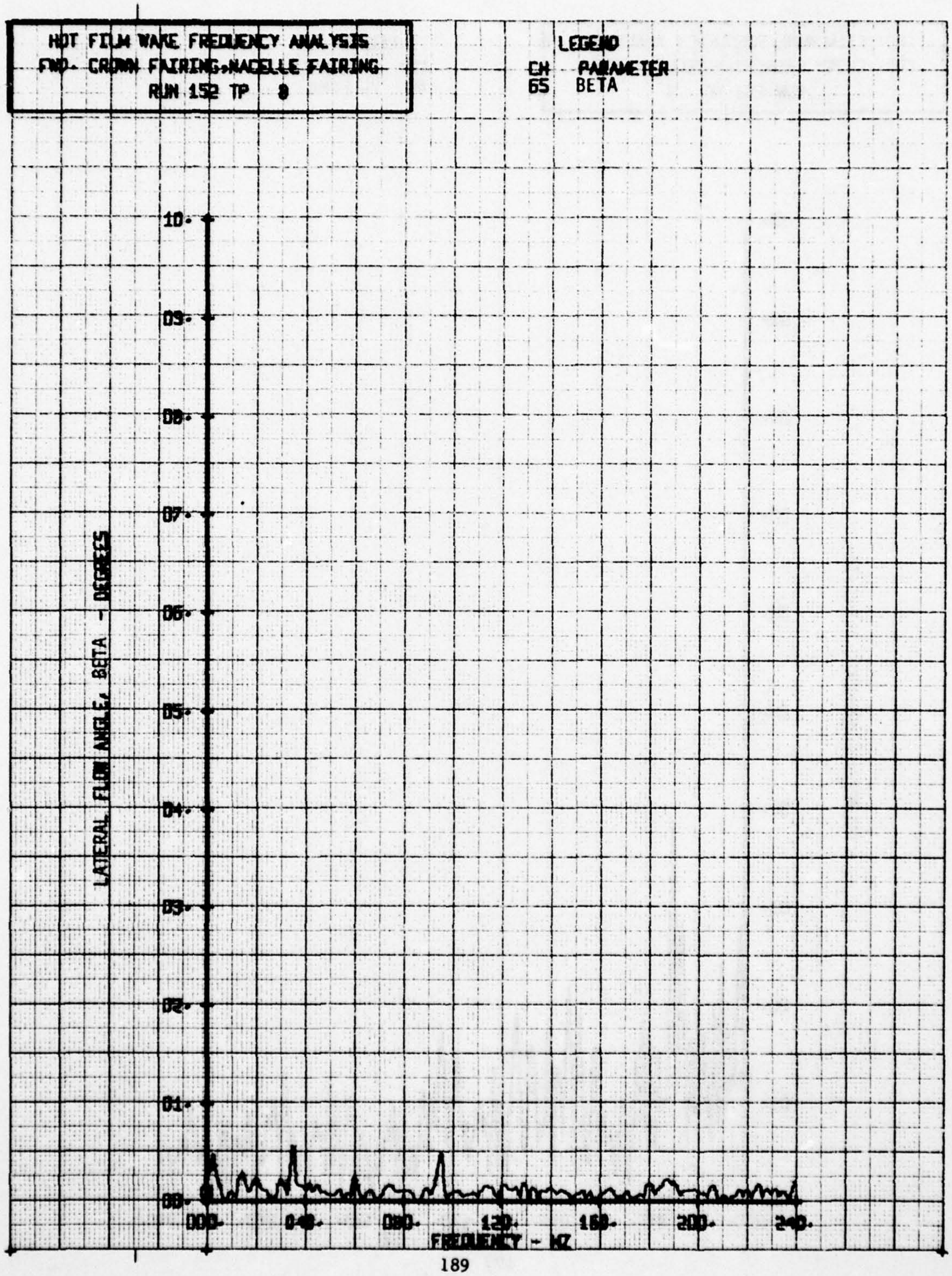
FREQUENCY - HZ


HOT FILM WAKE FREQUENCY ANALYSIS
FWD. CROWN FAIRING, NACELLE FAIRING
RUN 152 TP 8
LEGEND
CH PARAMETER
65 BETA
LATERAL FLOW ANGLE, BETA - DEGREES
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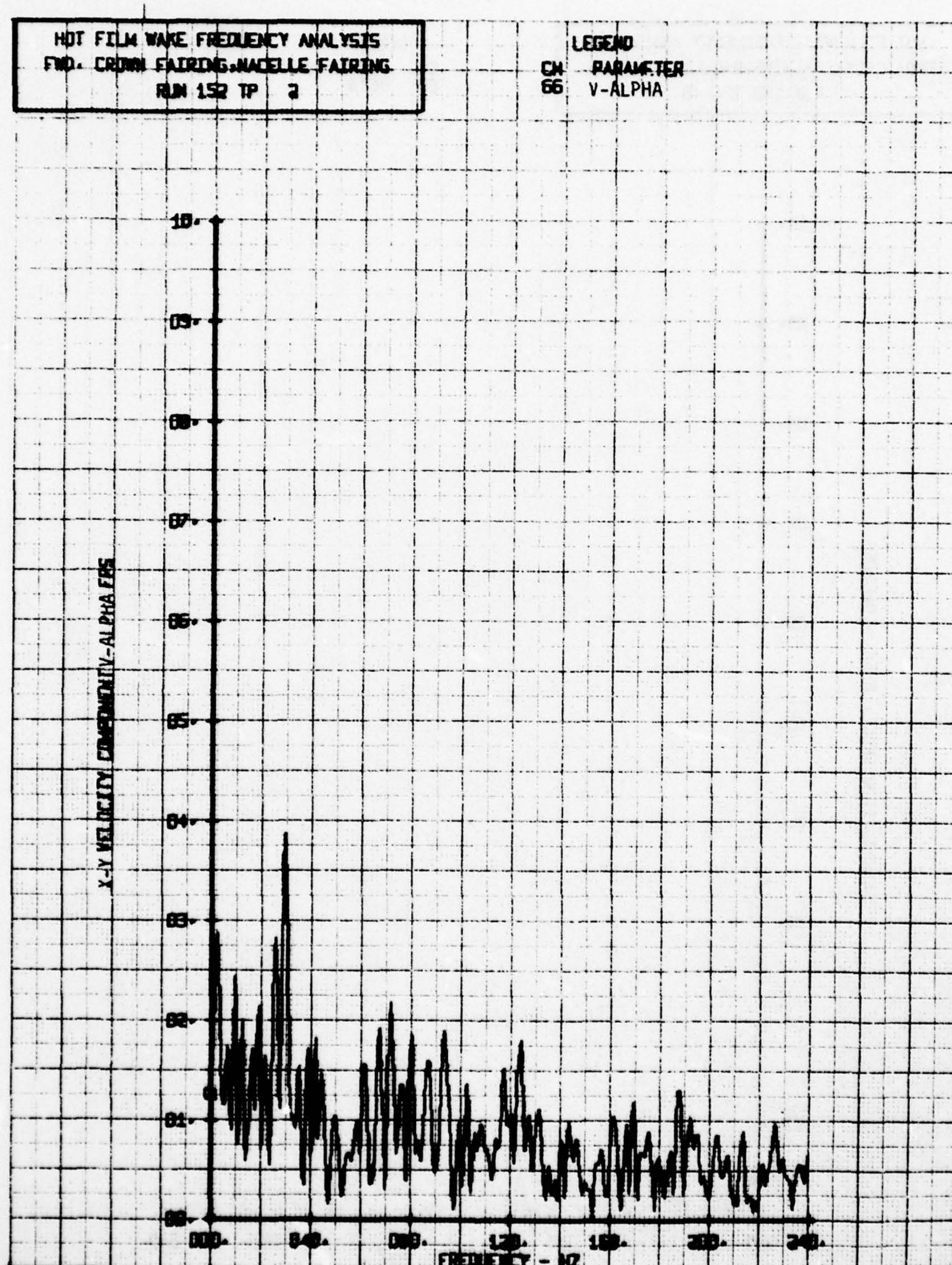
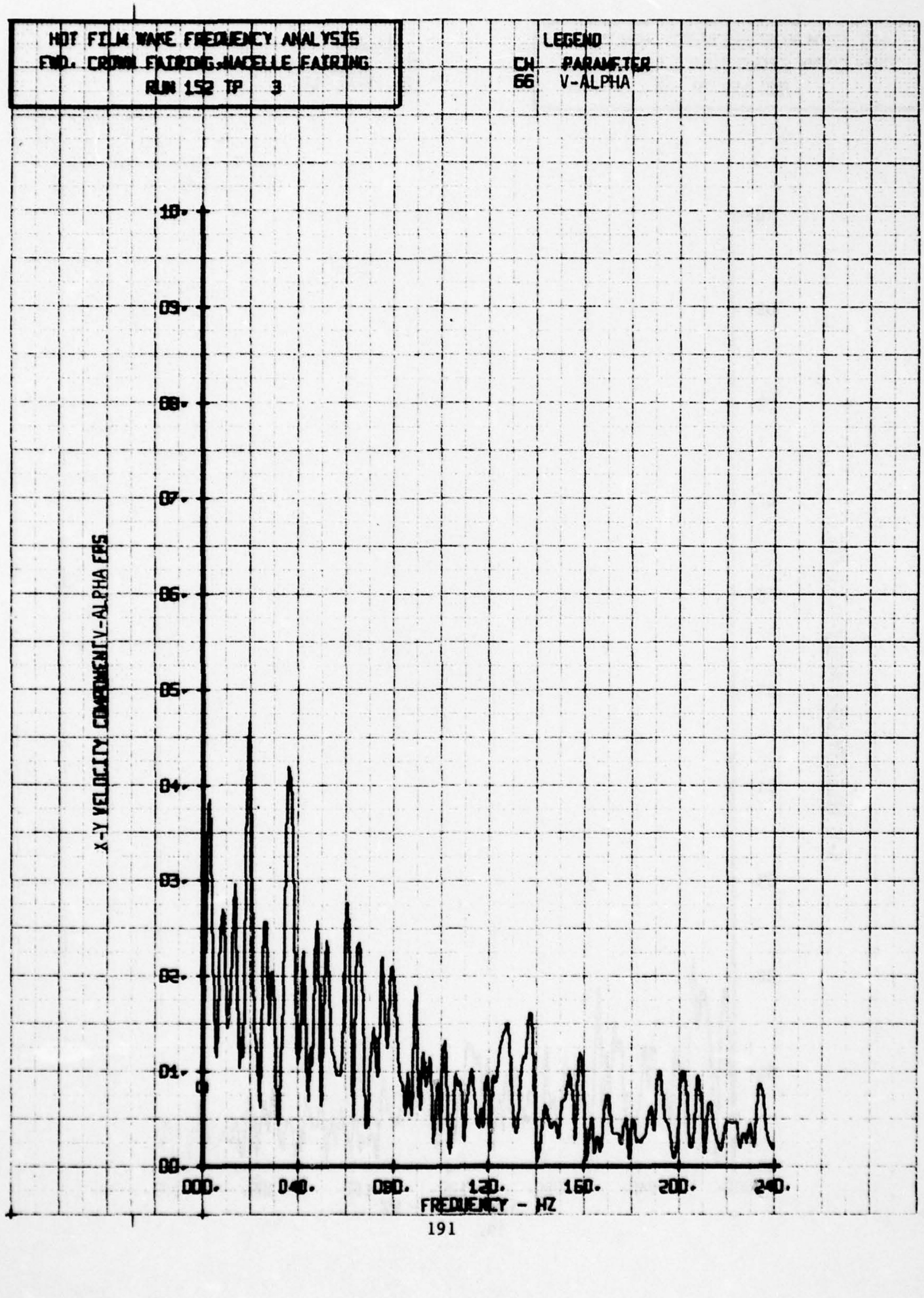
FREQUENCY - HZ



HOT FILM WAKE FREQUENCY ANALYSIS
FWD. CROWN FAIRING,NACELLE FAIRING
RUN 152 TP 2
LEGEND
CH PARAMETER
66 V-ALPHA
FREQUENCY - HZ


HOT FILM WAKE FREQUENCY ANALYSIS
FWD. CROWN FAIRING,NACELLE FAIRING
RUN 152 TP 3
LEGEND
CH PARAMETER
66 V-ALPHA
X-Y VELOCITY COMPONENT V-ALPHA FPS
FREQUENCY - HZ

AD-A062 642 BOEING VERTOL CO PHILADELPHIA PA F/G 1/3
INTERACTIONAL AERODYNAMICS OF THE SINGLE ROTOR HELICOPTER CONFI--ETC(U)
SEP 78 P F SHERIDAN DAAJ02-77-C-0020

UNCLASSIFIED USARTL-TR-78-23G-V-7G NL

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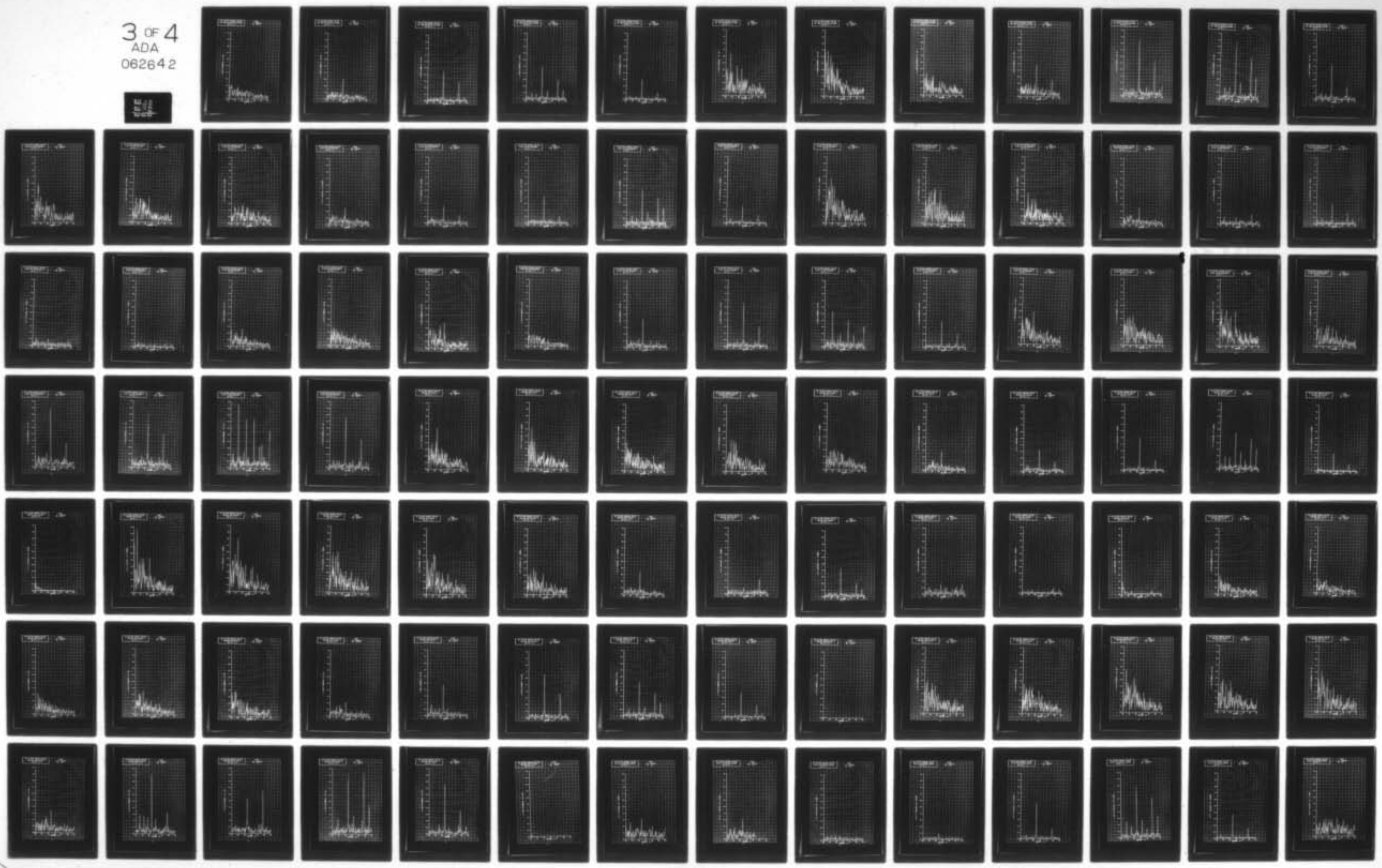

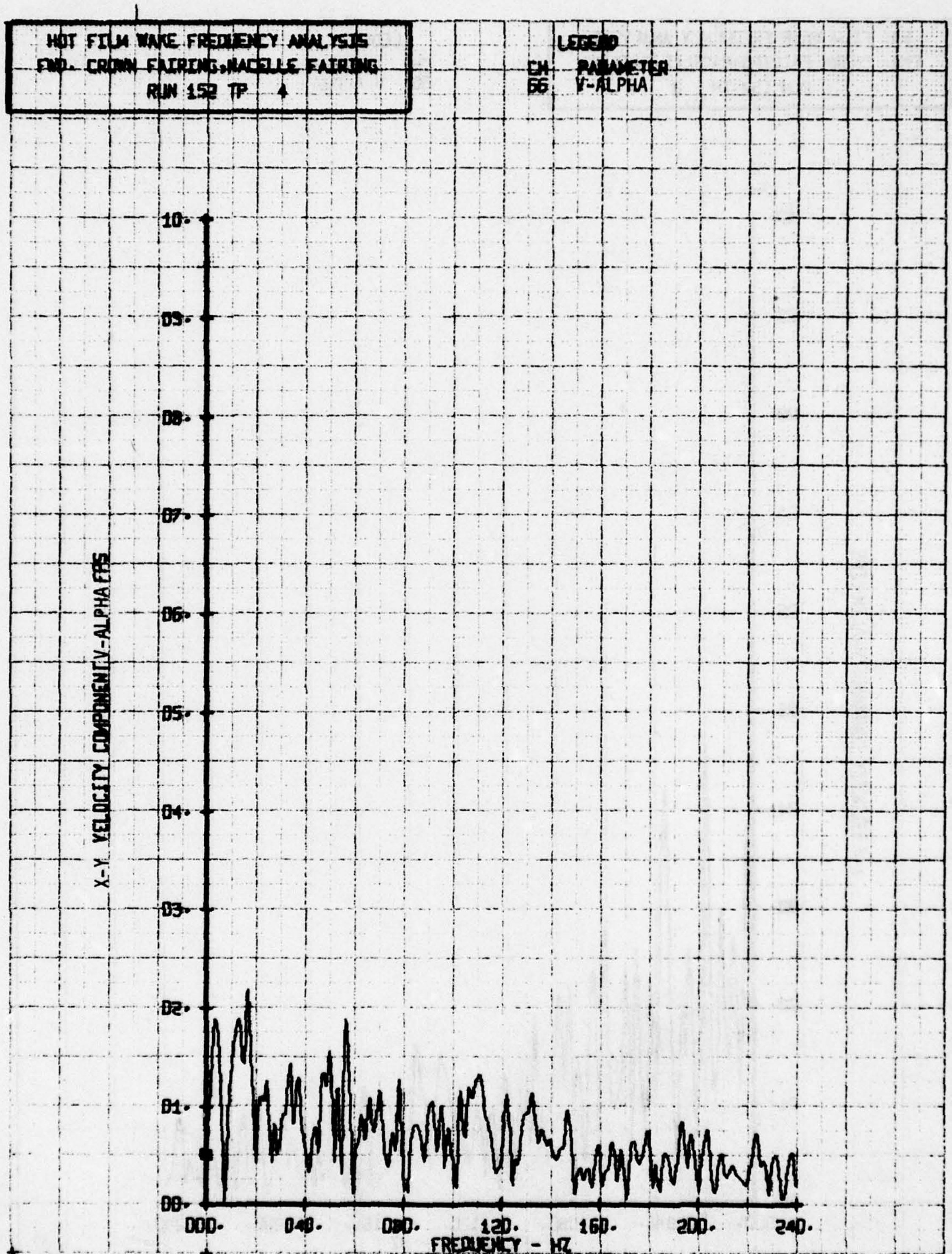
HOT FILM WAKE FREQUENCY ANALYSIS
FWD. CROWN FAIRING,NACELLE FAIRING
RUN 152 TP 4
LEGEND
CM PARAMETER
66 V-ALPHA
X-Y VELOCITY COMPONENT(V-ALPHA) FTS
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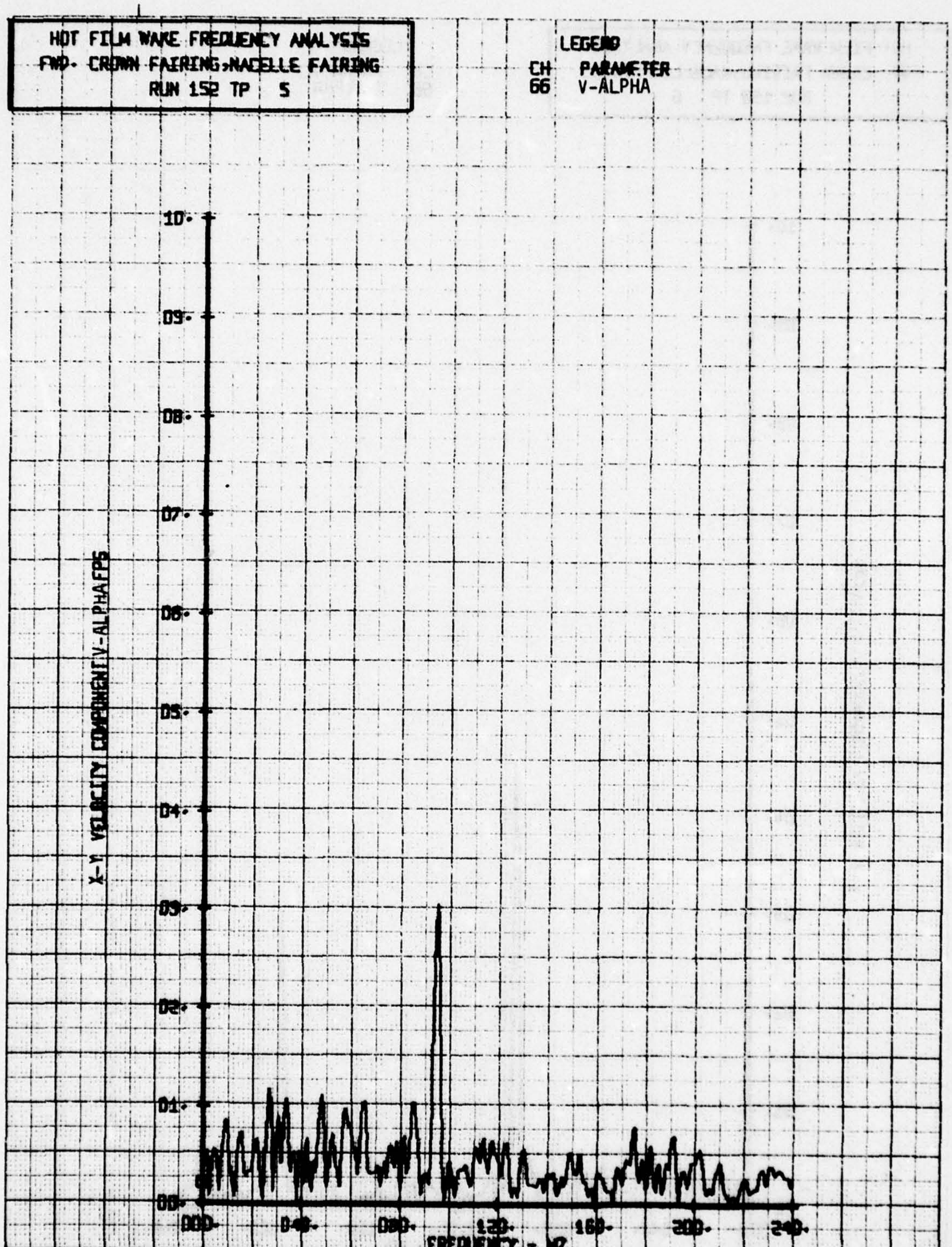
FREQUENCY - HZ


HOT FILM WAKE FREQUENCY ANALYSIS
FWD. CROWN FAIRING,NACELLE FAIRING
RUN 152 TP 5
LEGEND
CH PARAMETER
66 V-ALPHA
X-Y VELOCITY COMPONENT V-ALPHA FPS
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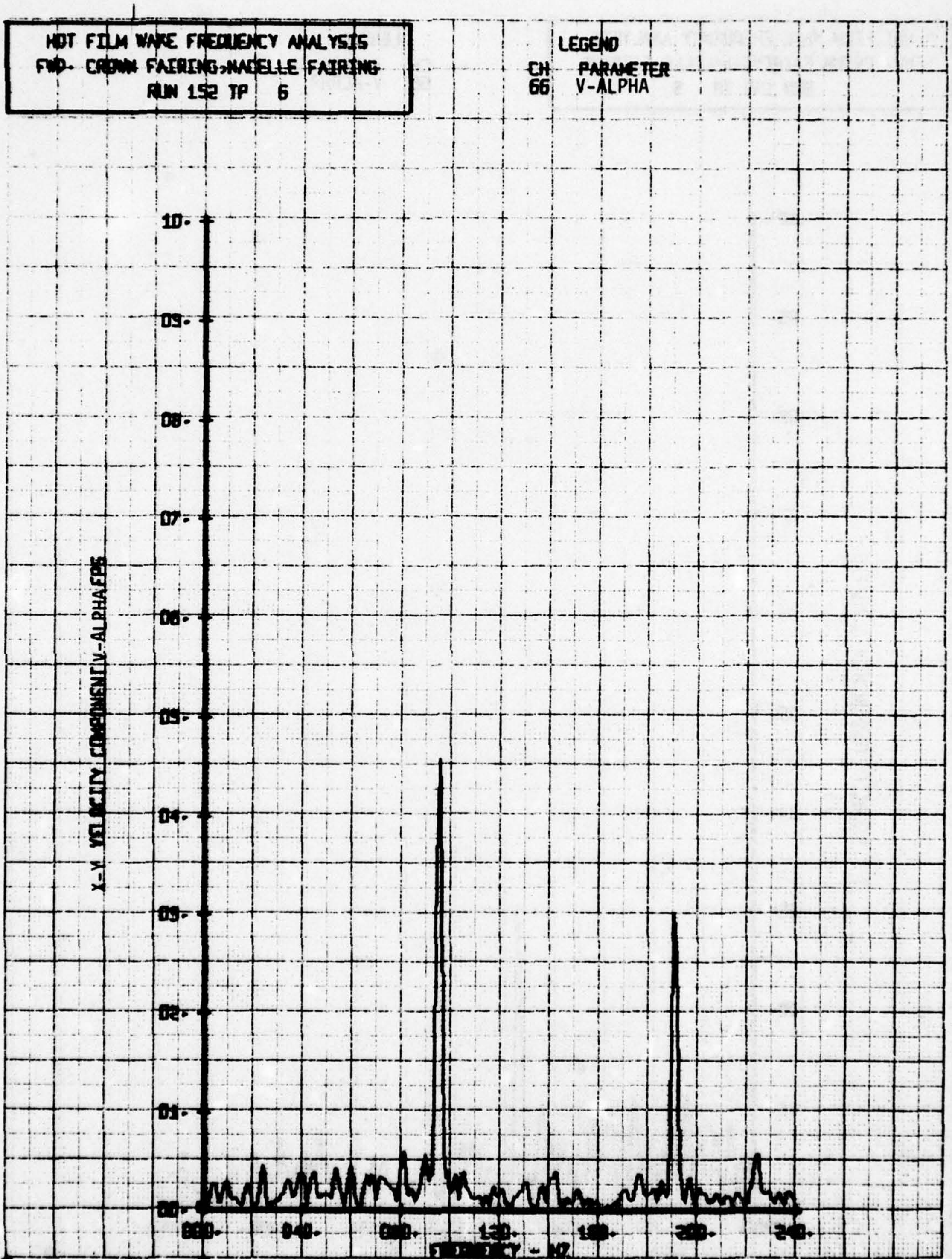
FREQUENCY - HZ


HOT FILM WAKE FREQUENCY ANALYSIS
FWD- CROWN FAIRING;NACELLE FAIRING
RUN 152 TP 6
LEGEND
CH PARAMETER
66 V-ALPHA
X-Y VELOCITY COMPONENT V-ALPHA FPS
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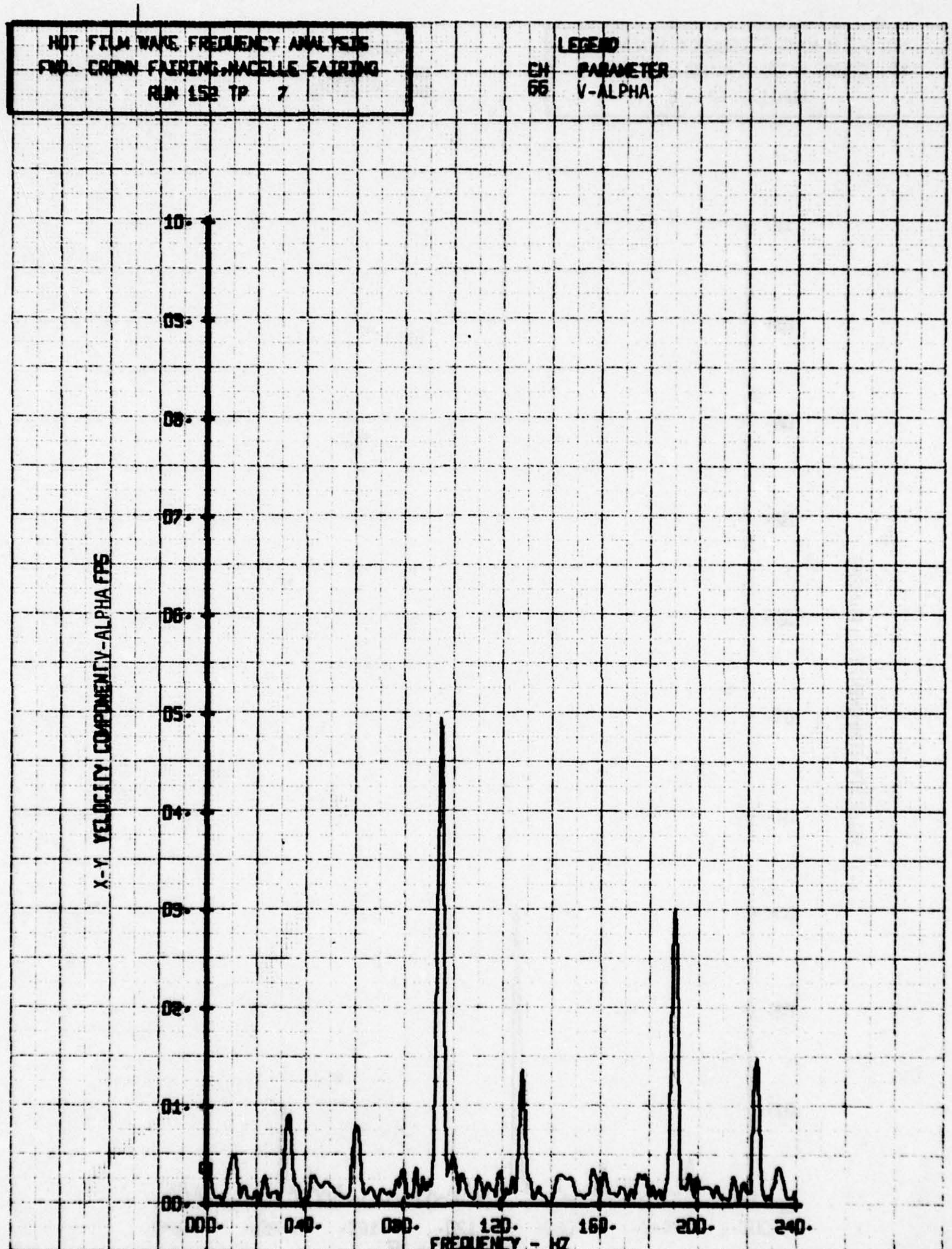
HOT FILM WAKE FREQUENCY ANALYSIS
FWD. CROWN FAIRING,NACELLE FAIRING
RUN 152 TP 7
LEGEND
CH PARAMETER
66 V-ALPHA
X-Y VELOCITY COMPONENT V-ALPHA FPS
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160.
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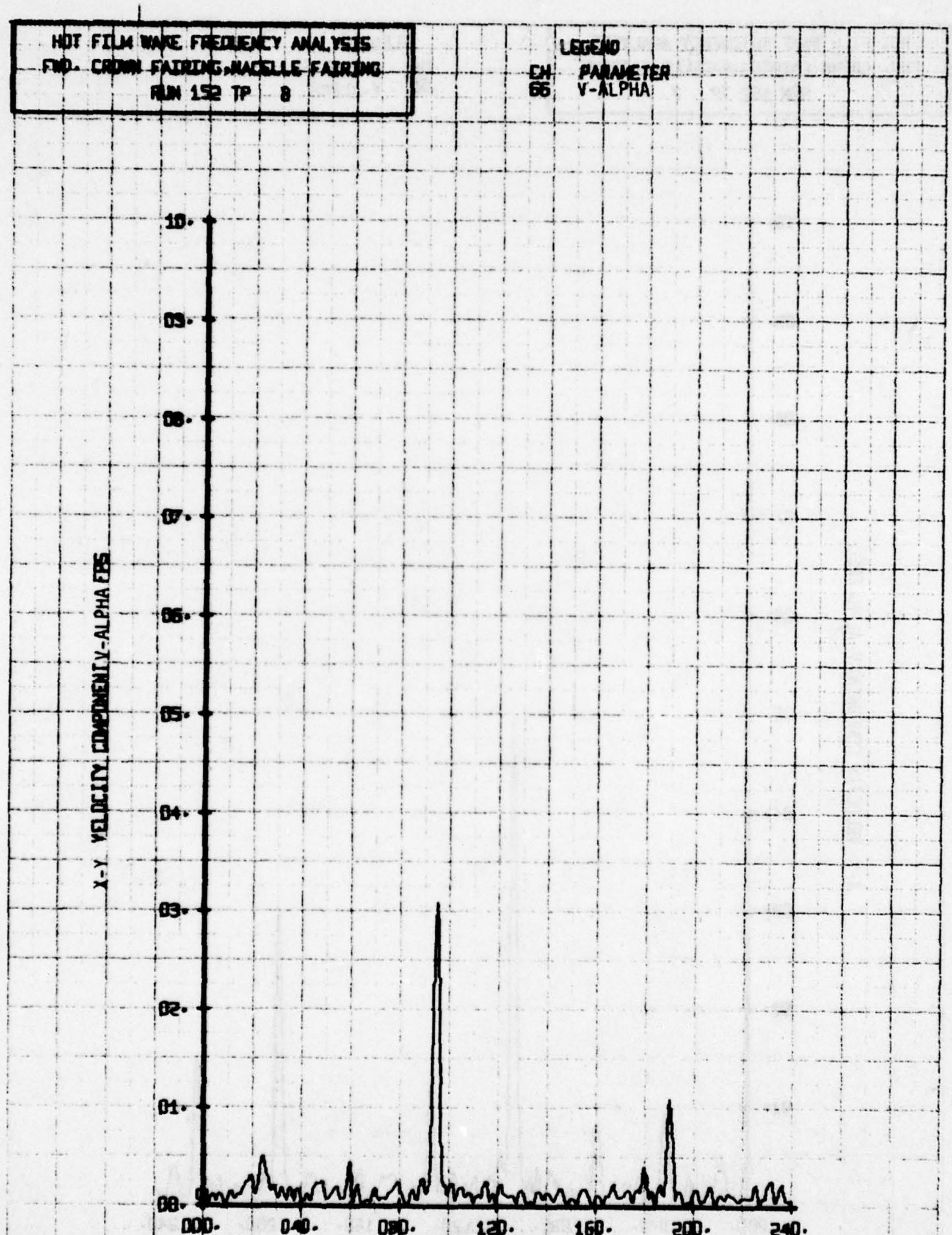
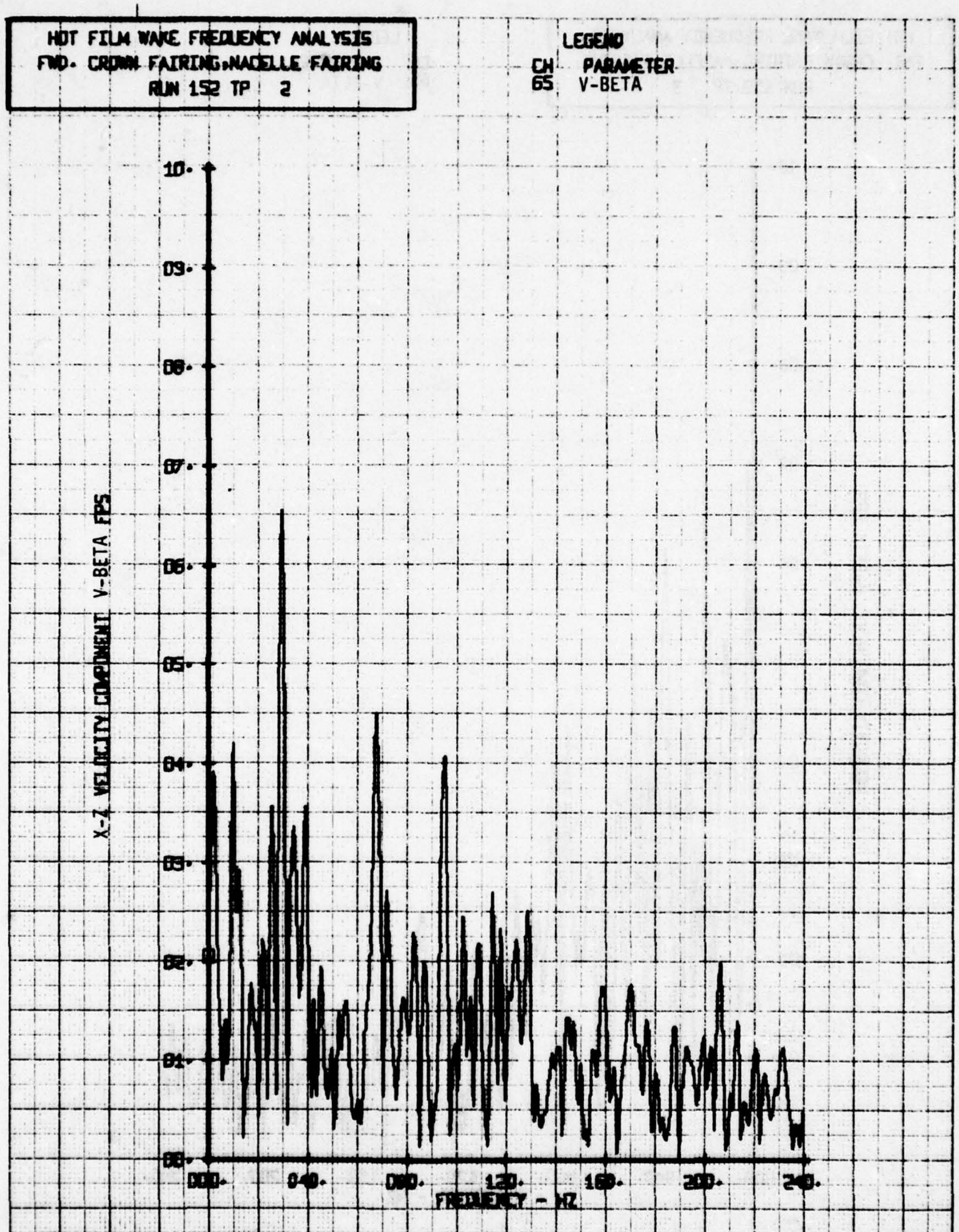
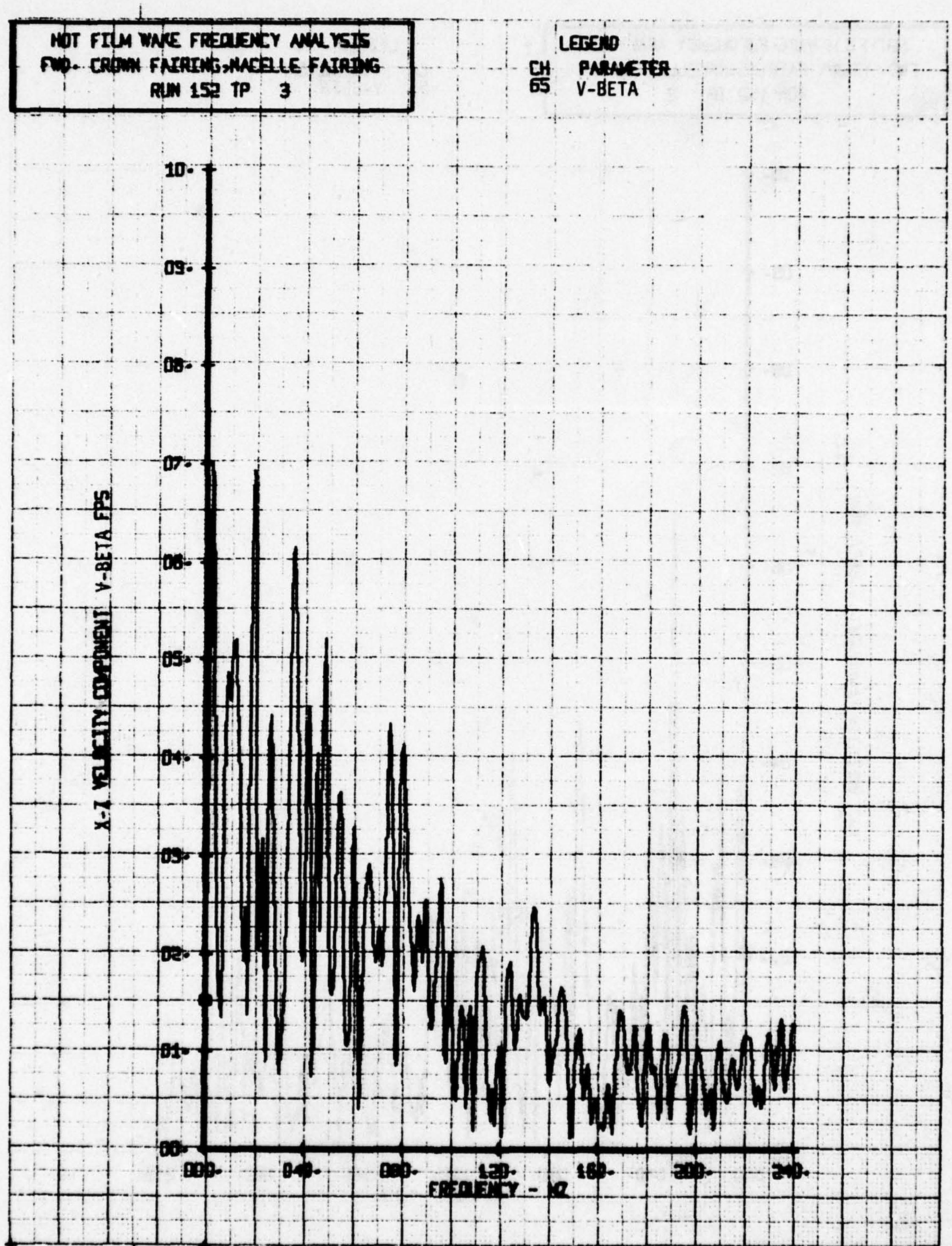
240.
FREQUENCY - HZ


HOT FILM WAKE FREQUENCY ANALYSIS
FWD. CROWN FAIRING,NACELLE FAIRING
RUN 152 TP 8
LEGEND
CH PARAMETER
66 V-ALPHA
X-Y VELOCITY COMPONENTV-ALPHA FPS
FREQUENCY - HZ


HOT FILM WAKE FREQUENCY ANALYSIS
FWD. CROWN FAIRING,NACELLE FAIRING
RUN 152 TP 2
LEGEND
CH PARAMETER
65 V-BETA
X-Z VELOCITY COMPONENT V-BETA FPS
FREQUENCY - HZ


HOT FILM WAKE FREQUENCY ANALYSIS
FWD- CROWN FAIRING,NACELLE FAIRING
RUN 152 TP 3
LEGEND
CH PARAMETER
65 V-BETA
X-Z VELOCITY COMPONENT V-BETA FPS
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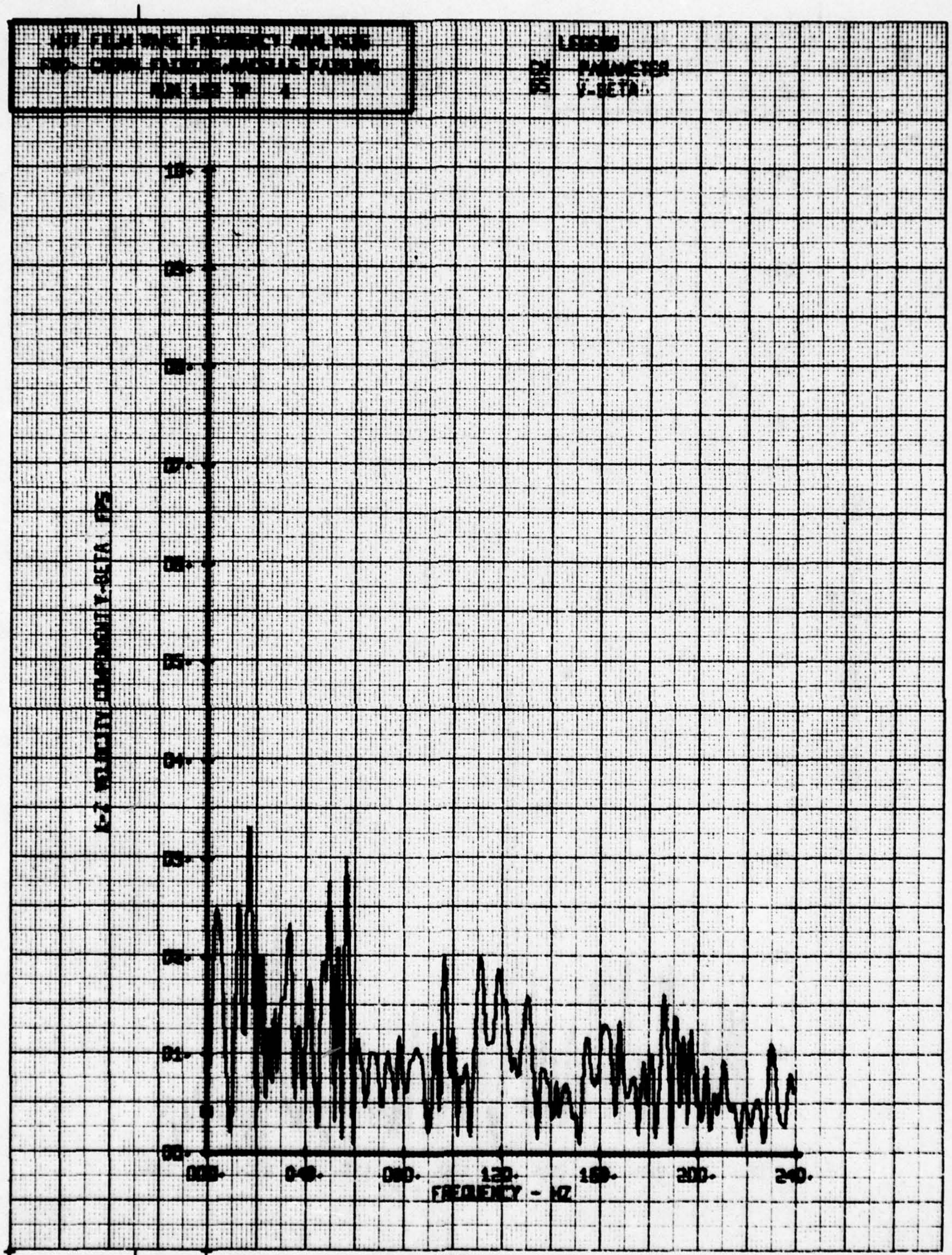
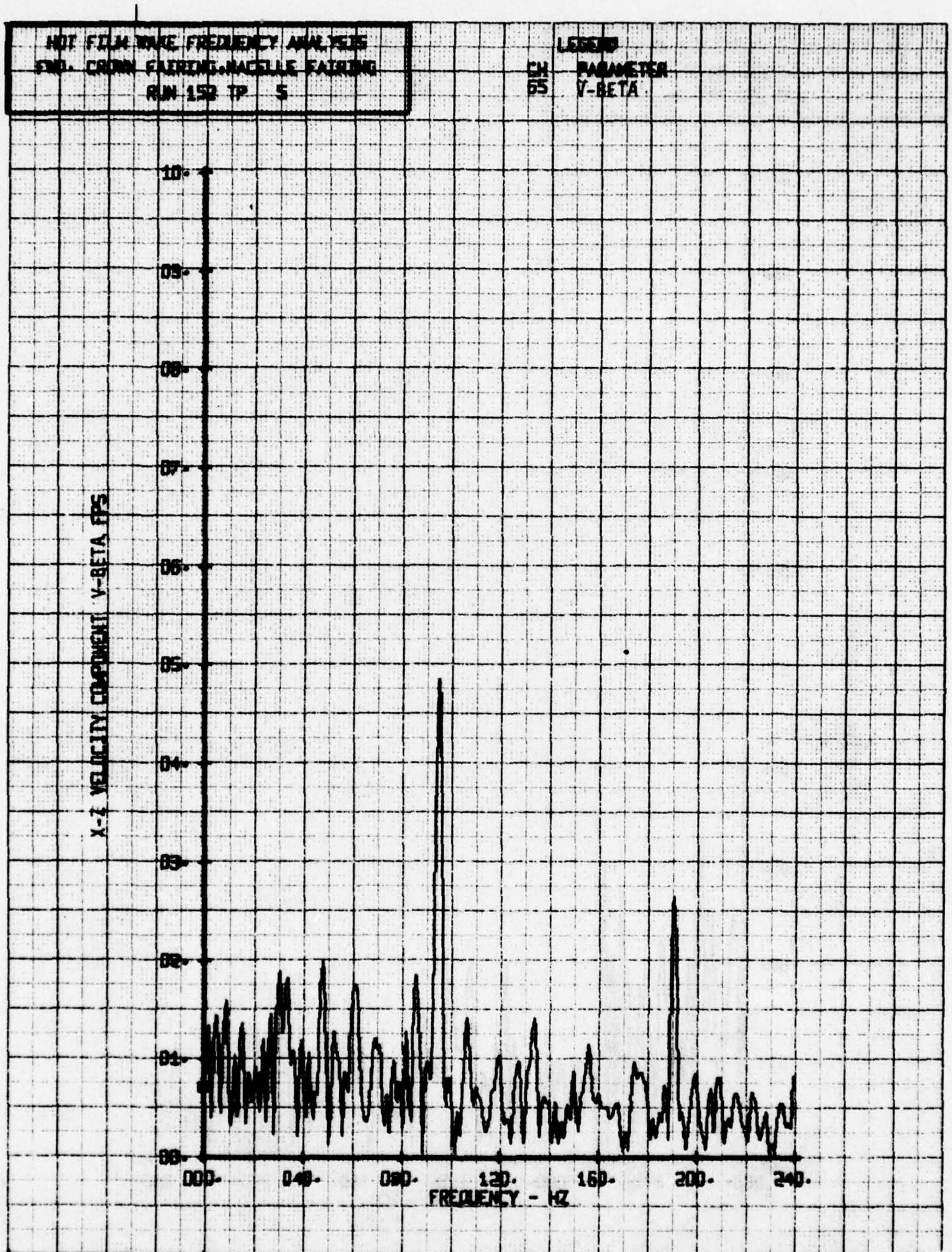
240
FREQUENCY - HZ


LEGEND
PARAMETER
V-BETA
000.
040.
080.
120.
160.
200.
240.
FREQUENCY - HZ


HOT FILM WAKE FREQUENCY ANALYSIS
FWD. CROWN FAIRING+NACELLE FAIRING
RUN 152 TP 5
LEGEND
CH PARAMETER
65 V-BETA
X-Z VELOCITY COMPONENT V-BETA FPS
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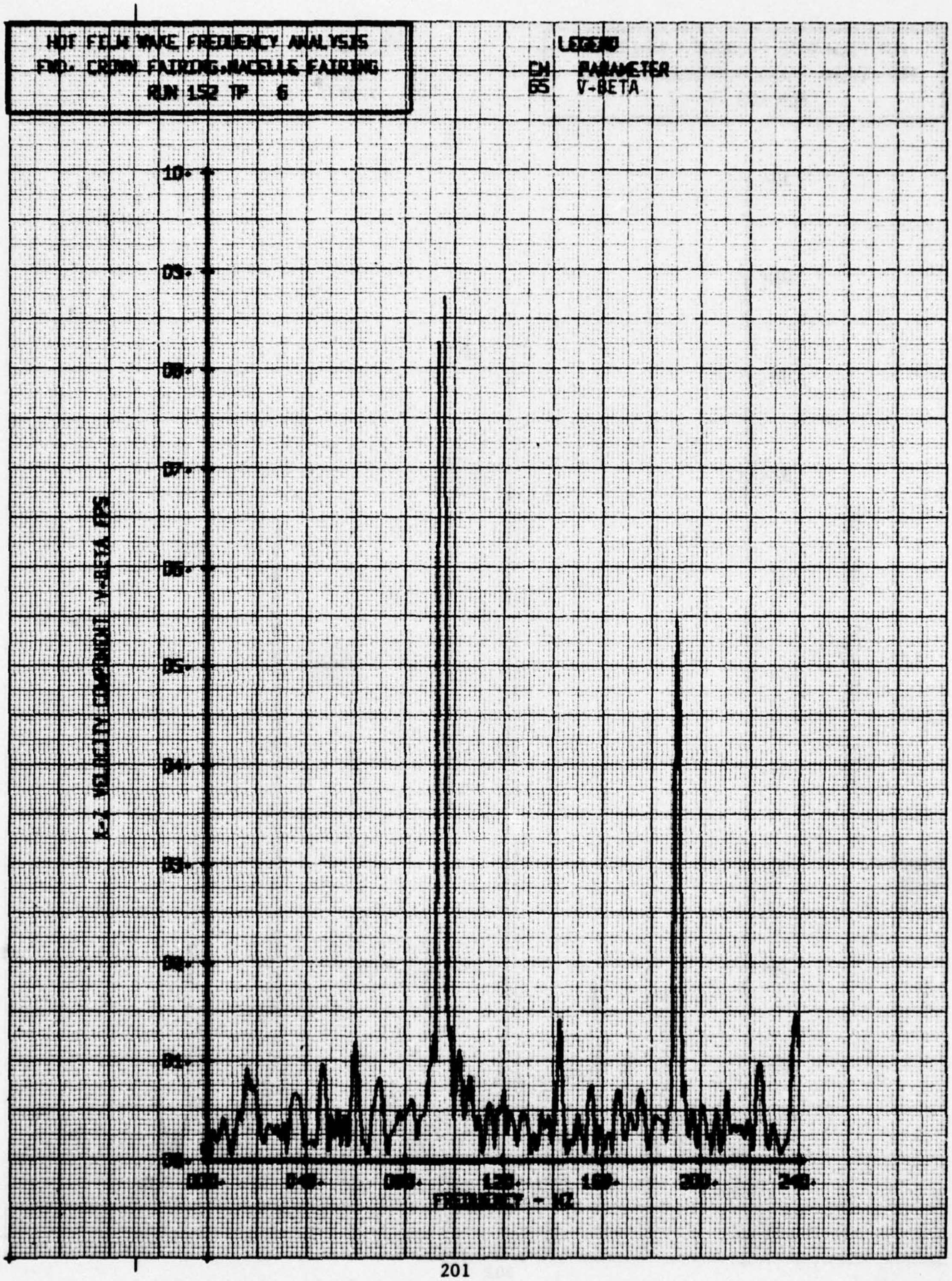
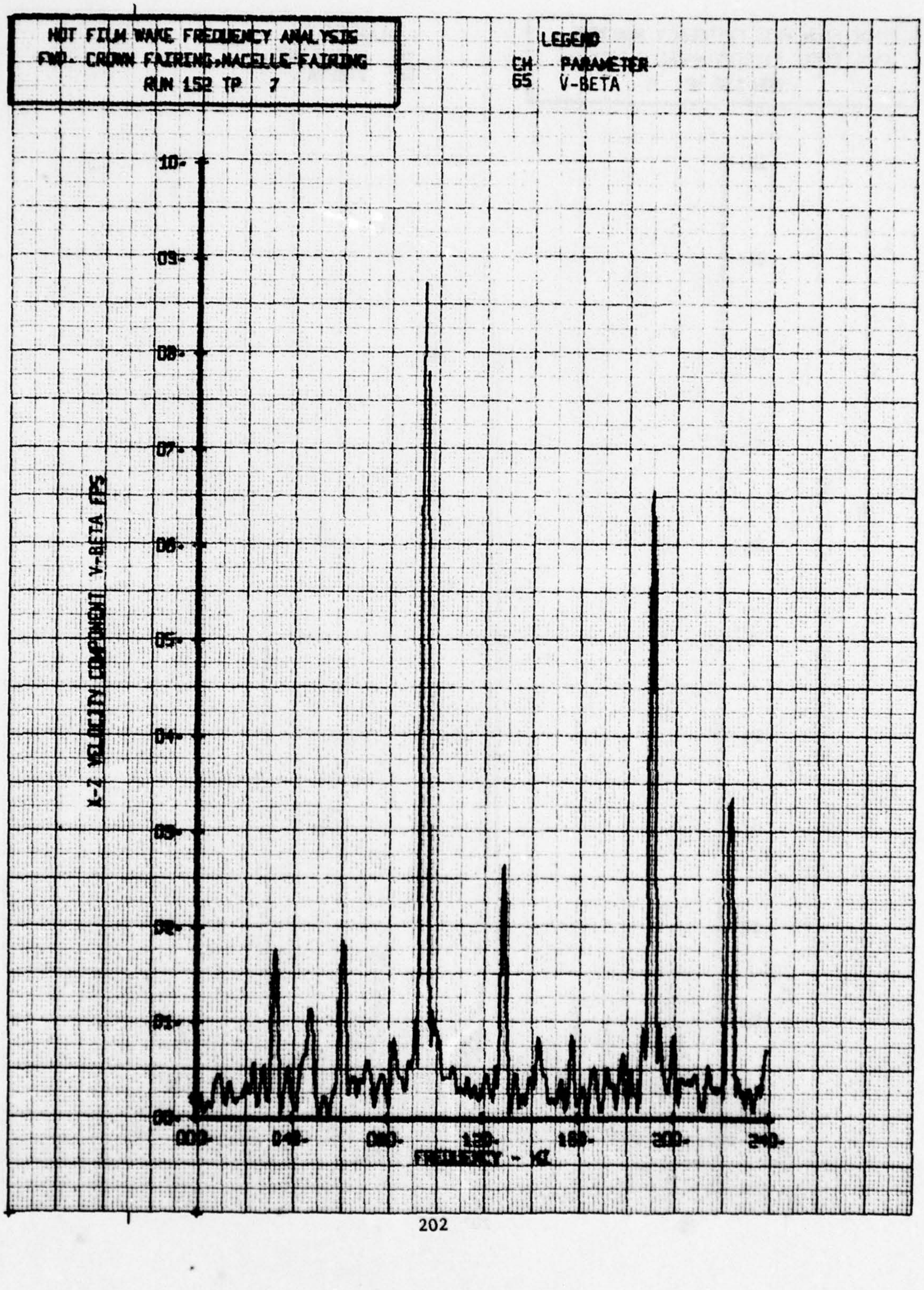
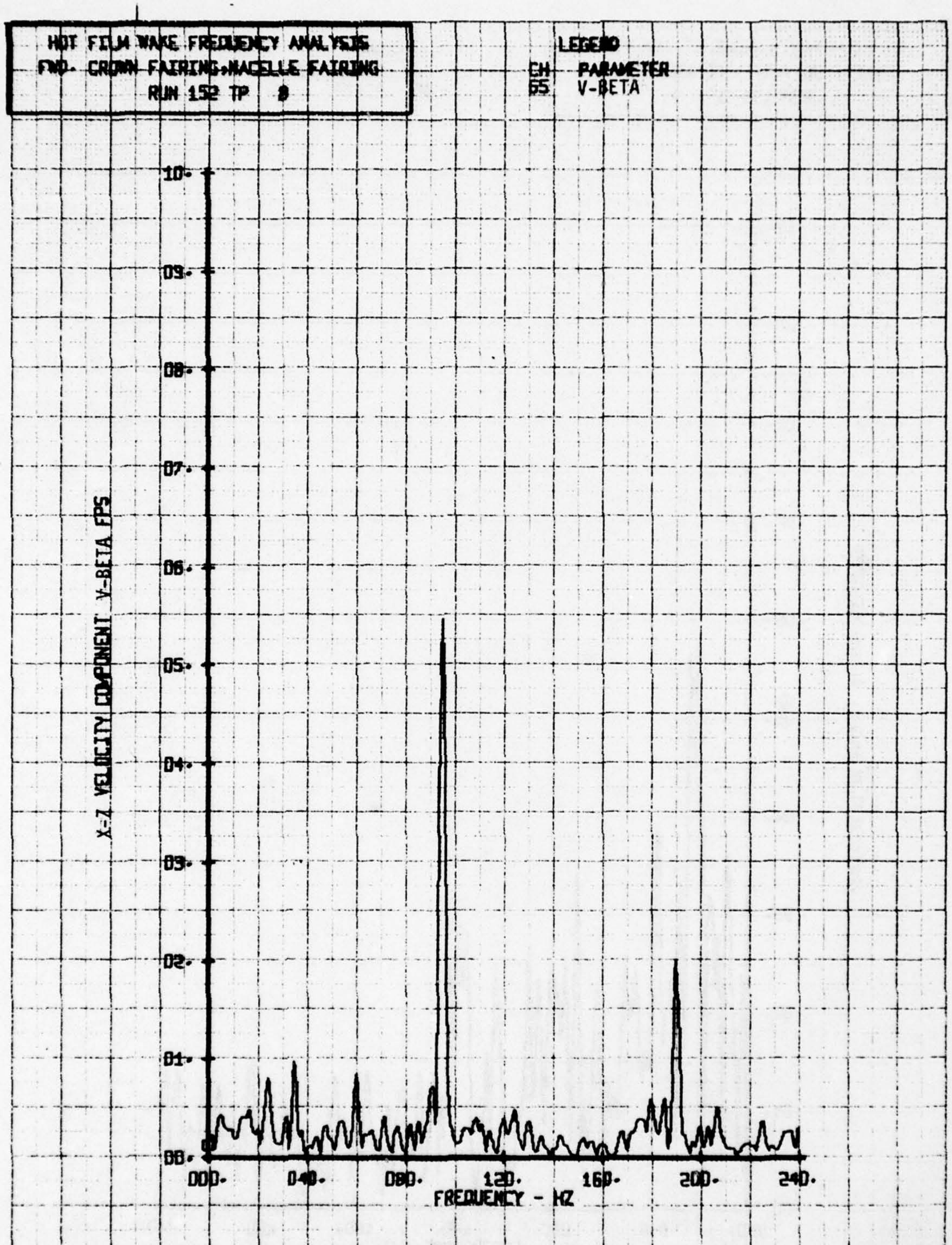
FREQUENCY - HZ


HOT FILM WAVE FREQUENCY ANALYSIS
FWD. CROWN FAIRING,NACELLE FAIRING
RUN 152 TP 6
LEGEND
CH PARAMETER
65 V-BETA
X-Z VELOCITY COMPONENT V-BETA FPS
FREQUENCY - HZ



HOT FILM WAKE FREQUENCY ANALYSIS
FWD. CROWN FAIRING,NACELLE FAIRING
RUN 152 TP 7
LEGEND
CH PARAMETER
65 V-BETA
X-Z VELOCITY COMPONENT V-BETA FPS
FREQUENCY - HZ


HOT FILM WAKE FREQUENCY ANALYSIS
FWD. CROWN FAIRING,NACELLE FAIRING
RUN 152 TP 8
LEGEND
CH PARAMETER
65 V-BETA
X-Z VELOCITY COMPONENT V-BETA FPS
FREQUENCY - HZ
000. 040. 080. 120. 160. 200. 240.
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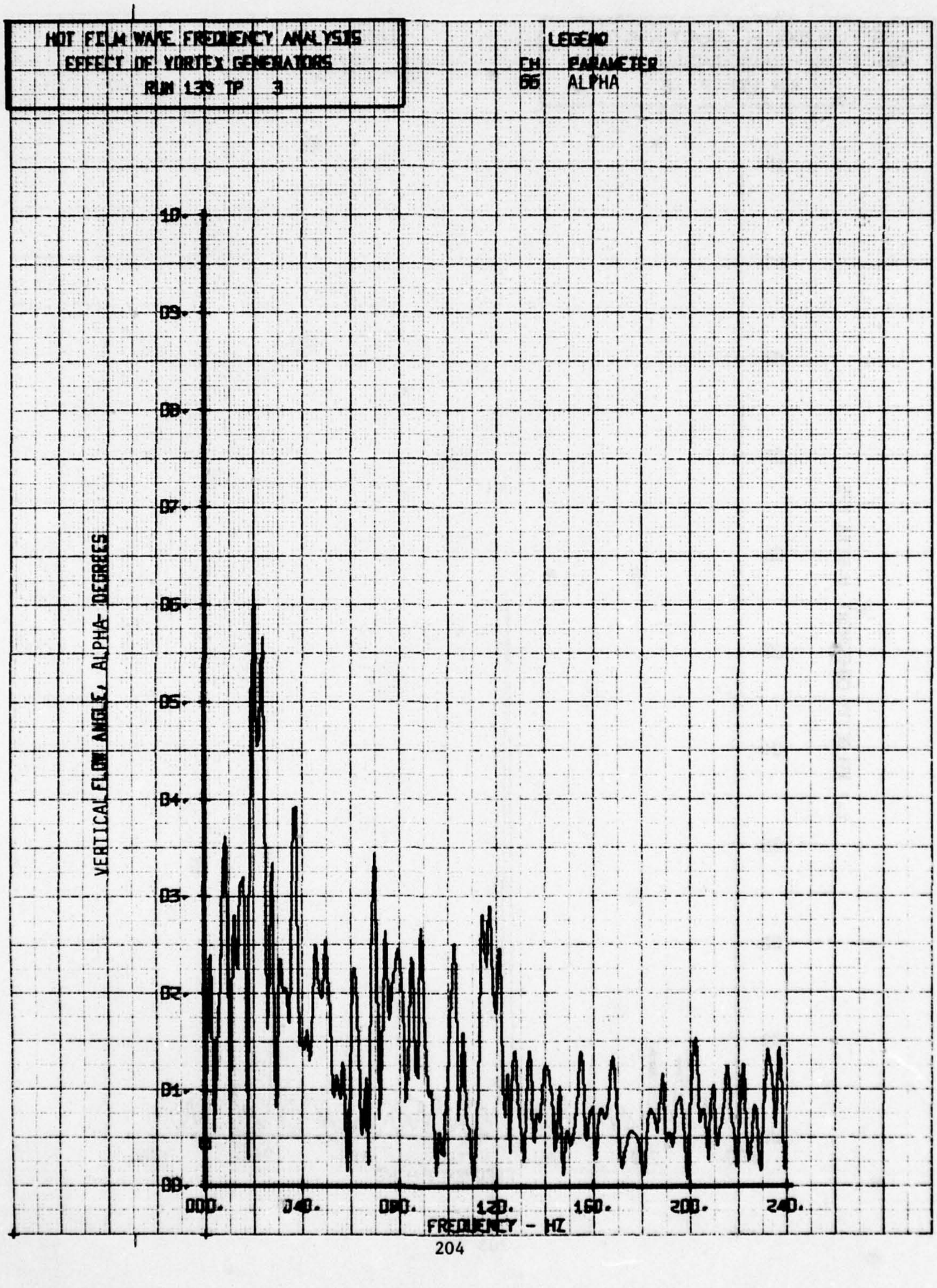
HOT FILM WAKE FREQUENCY ANALYSIS
EFFECT OF VORTEX GENERATORS
RUN 133 TP 3
LEGEND
CH PARAMETER
66 ALPHA
VERTICAL FLOW ANGLE, ALPHA- DEGREES
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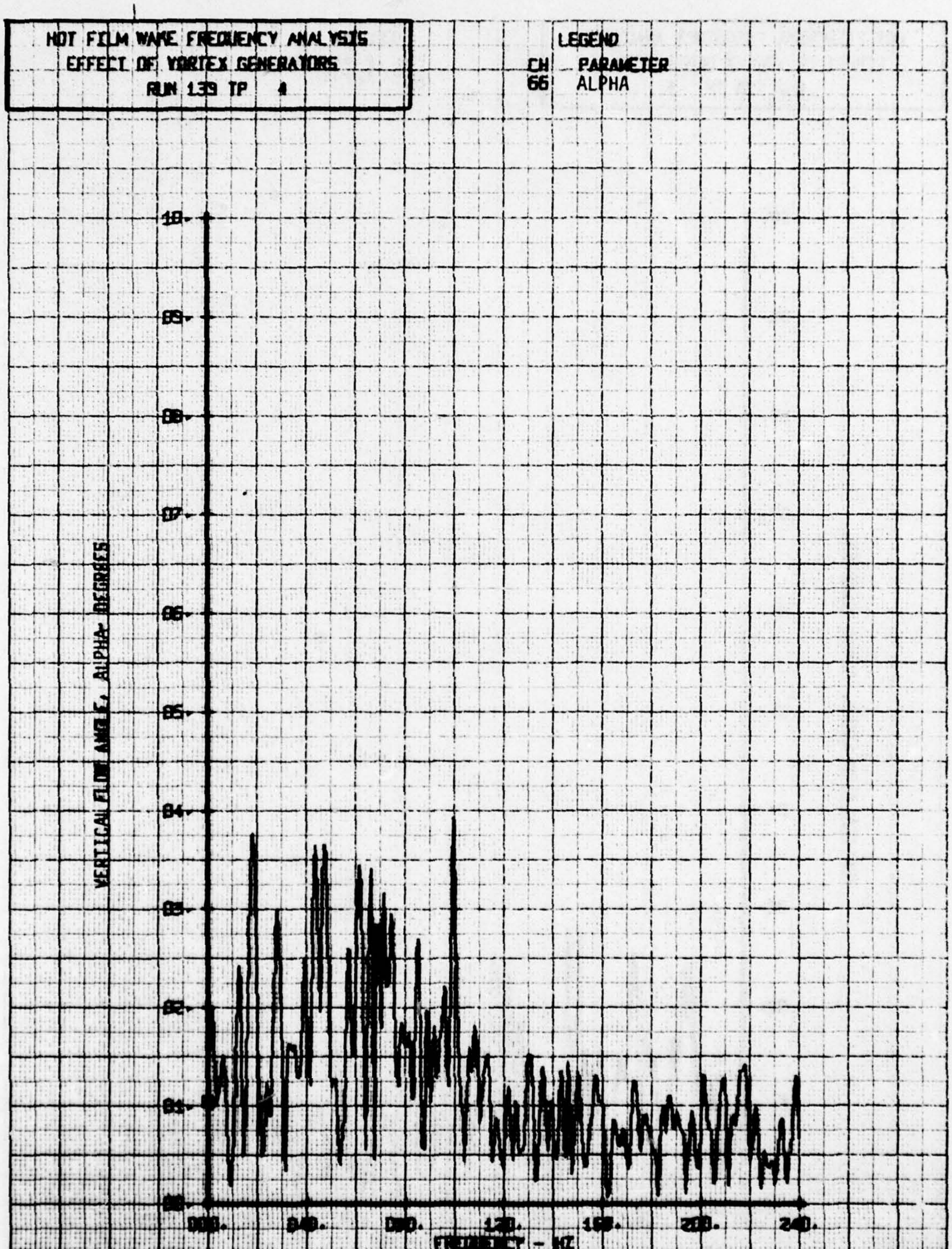
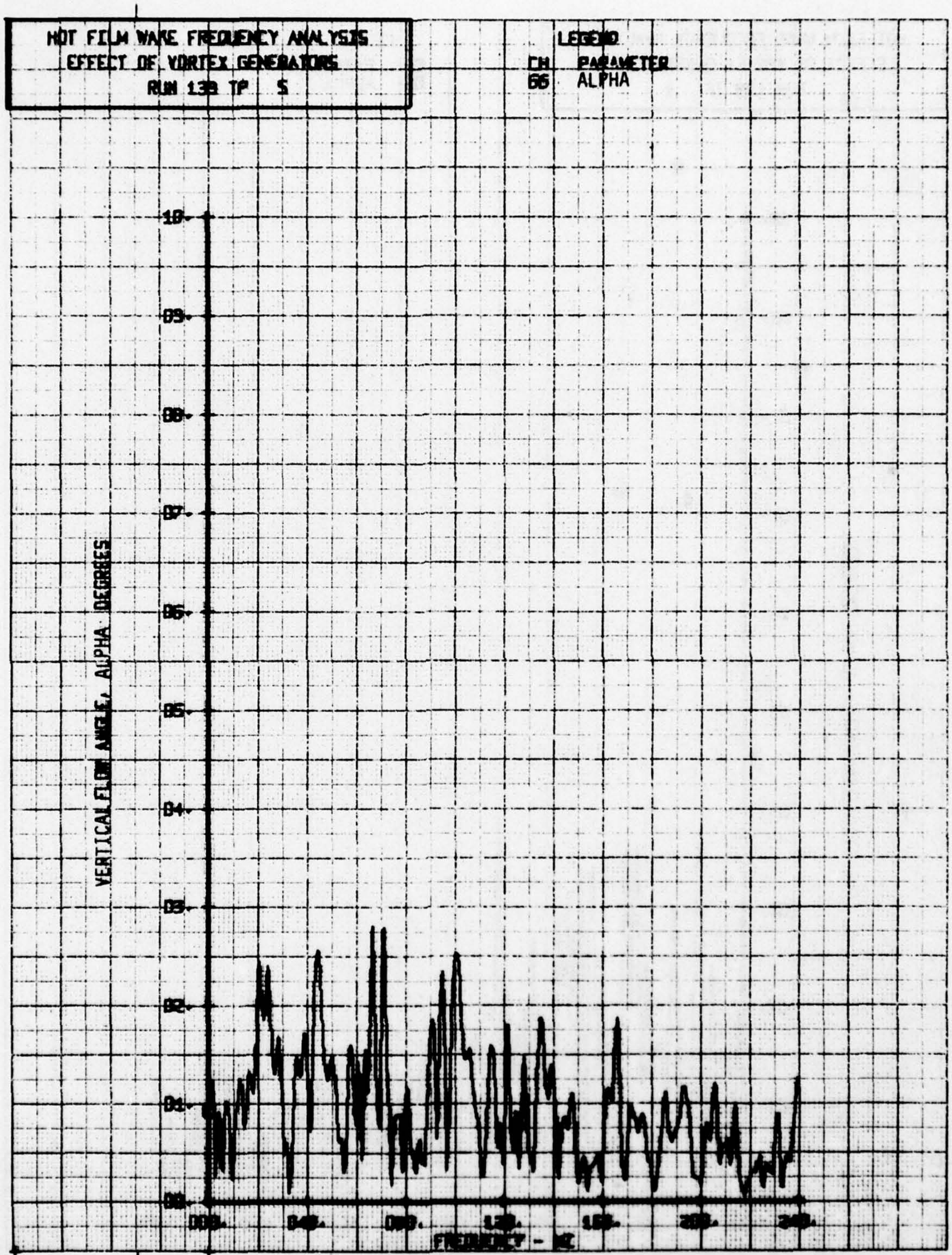
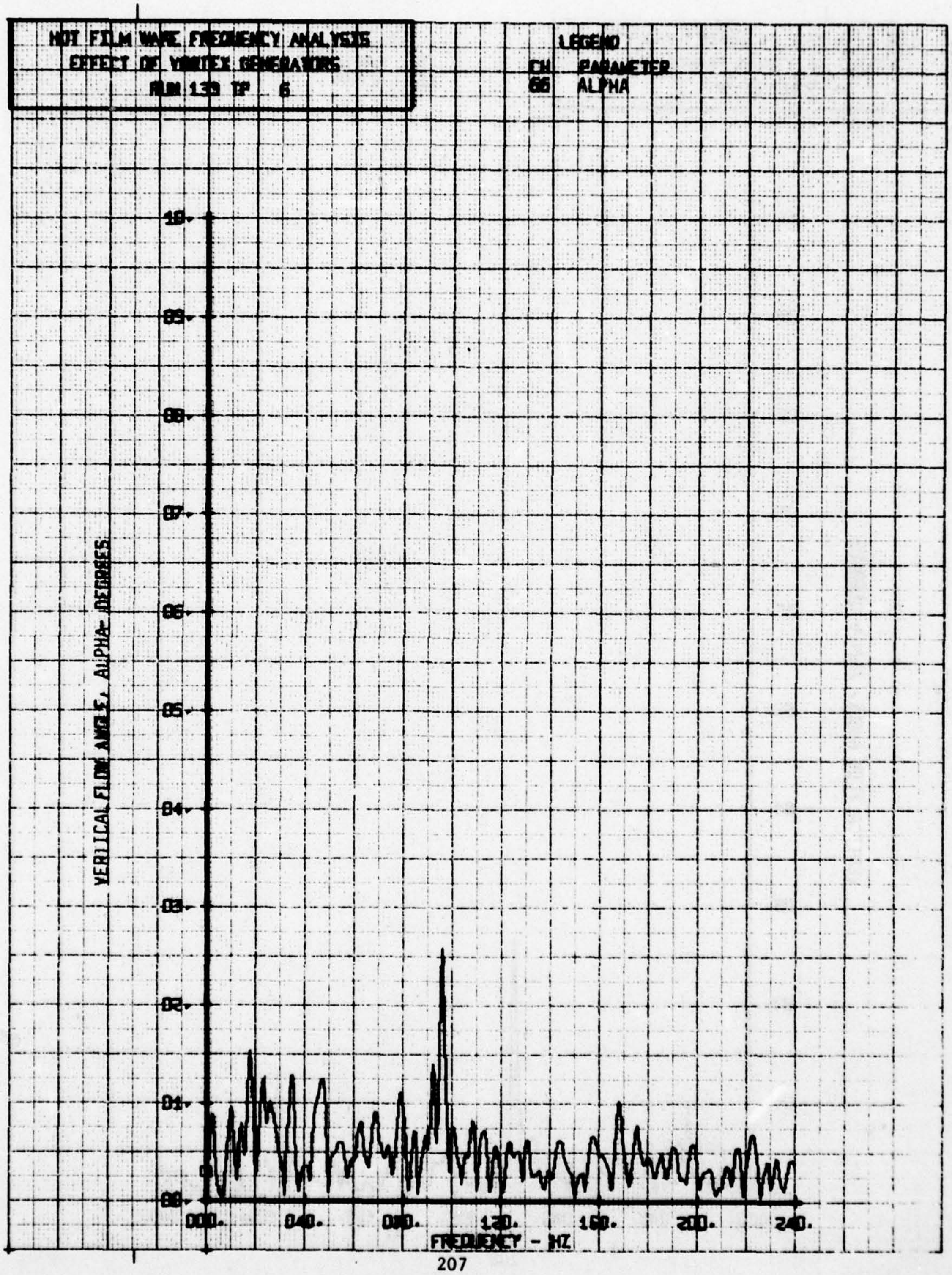
FREQUENCY - HZ

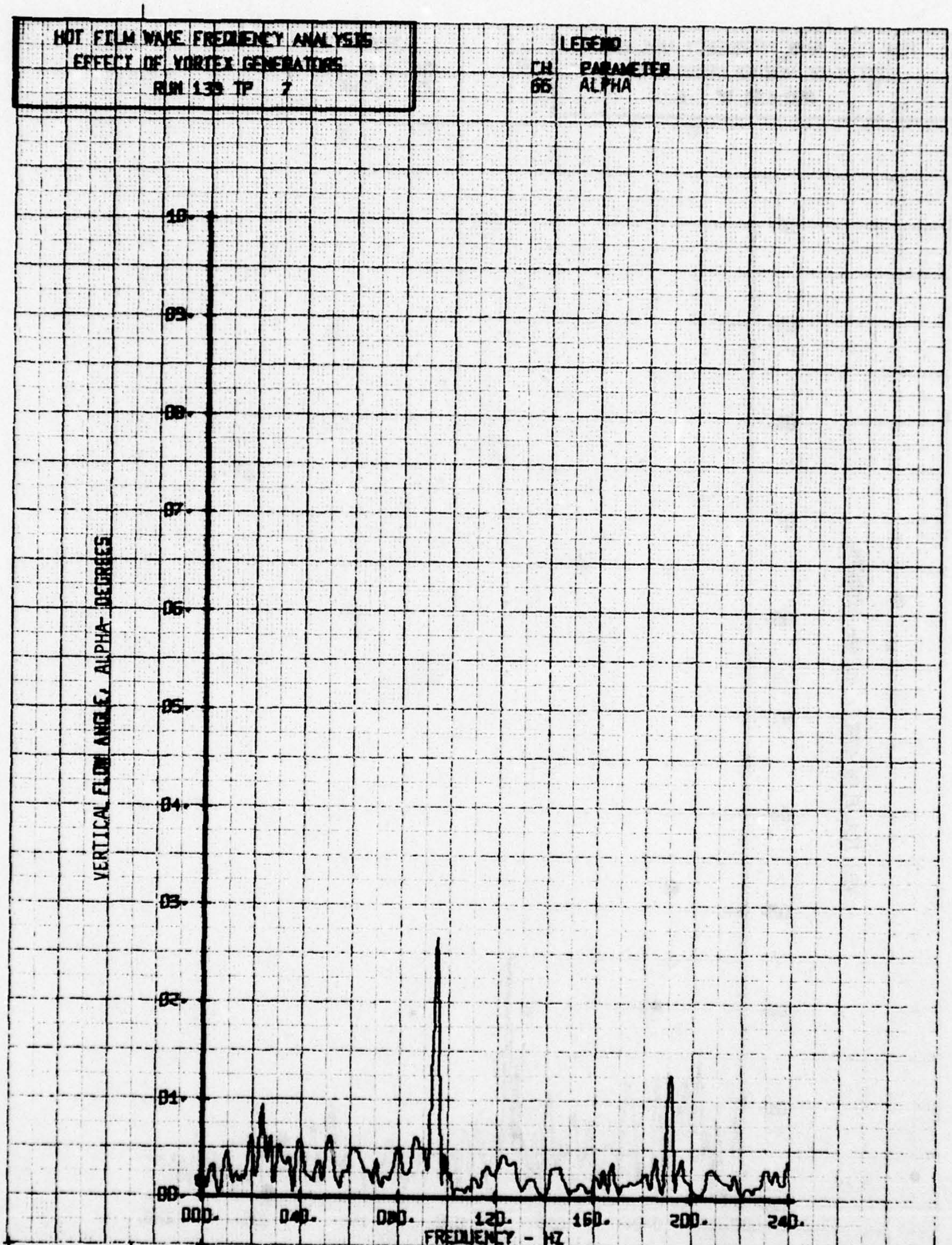

HOT FILM WAKE FREQUENCY ANALYSIS
EFFECT OF VORTEX GENERATORS
RUN 139 TP 4
LEGEND
CH PARAMETER
66 ALPHA
VERTICAL FLOW ANGLE, ALPHA, DEGREES
FREQUENCY - HZ



HOT FILM WAKE FREQUENCY ANALYSIS
EFFECT OF VORTEX GENERATORS
RUN 138 TP 5
LEGEND
CH PARAMETER
66 ALPHA
VERTICAL FLOW ANGLE, ALPHA DEGREES
FREQUENCY - HZ



HOT FILM WAKE FREQUENCY ANALYSIS
EFFECT OF VORTEX GENERATORS
RUN 139 TP 6
LEGEND
CH PARAMETER
66 ALPHA
VERTICAL FLOW ANGLE, ALPHA- DEGREES
FREQUENCY - HZ


HOT FILM WAKE FREQUENCY ANALYSIS
EFFECT OF VORTEX GENERATORS
RUN 139 TP 7
LEGEND
CH PARAMETER
66 ALPHA
VERTICAL FLOW ANGLE, ALPHA- DEGREES
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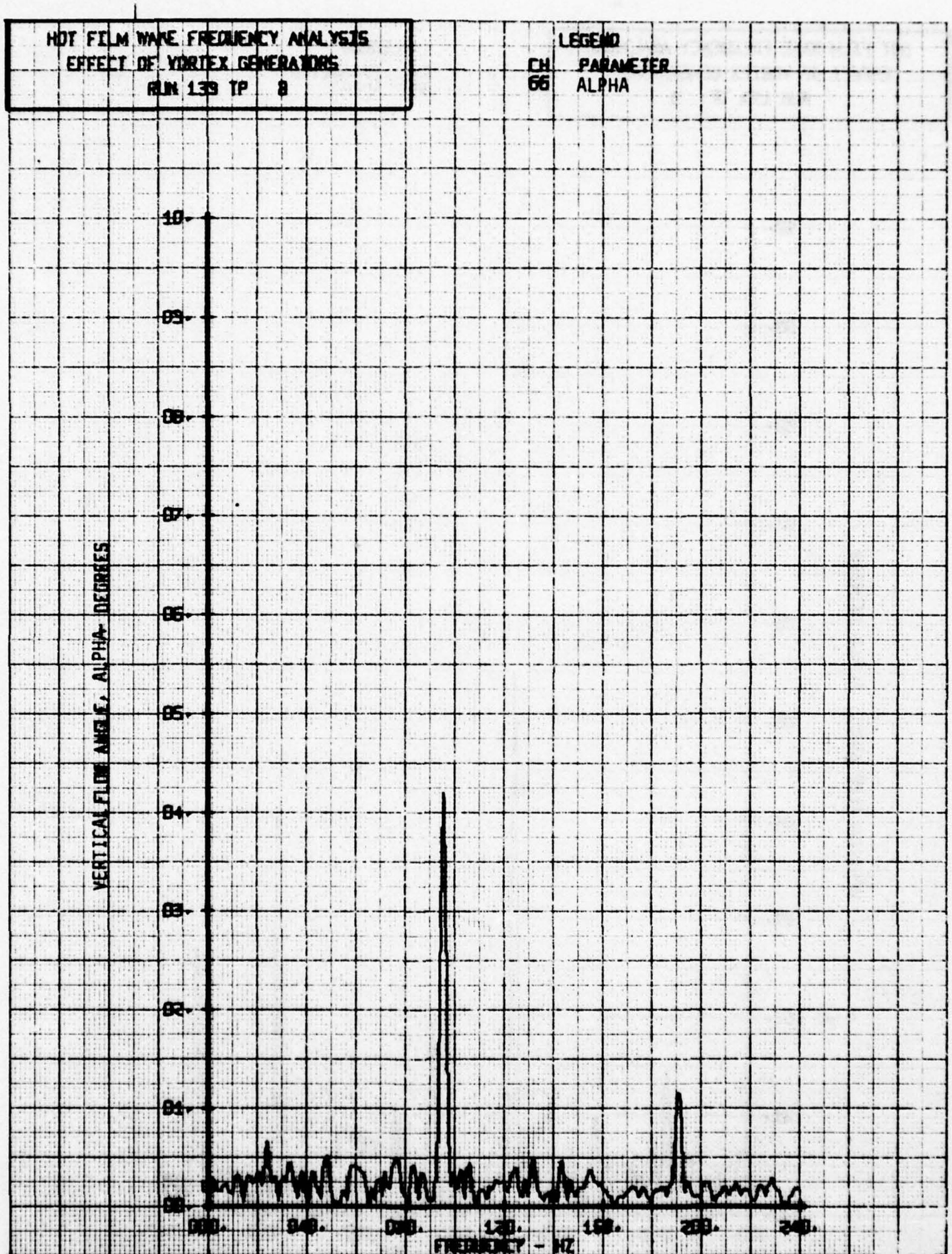
FREQUENCY - HZ


HOT FILM WAKE FREQUENCY ANALYSIS
EFFECT OF VORTEX GENERATORS
RUN 139 TP 8
LEGEND
CH PARAMETER
66 ALPHA
VERTICAL FLOW ANGLE, ALPHA- DEGREES
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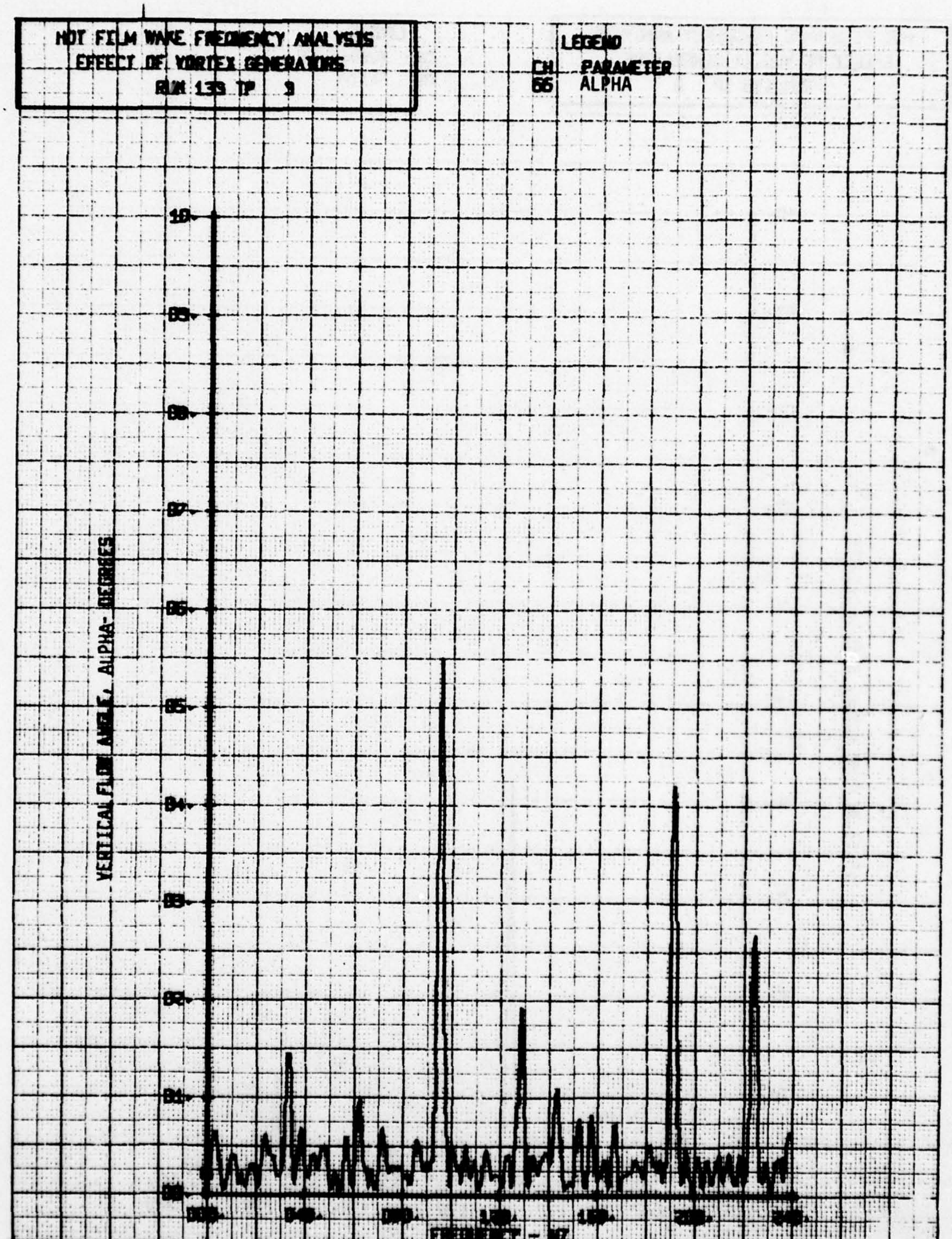
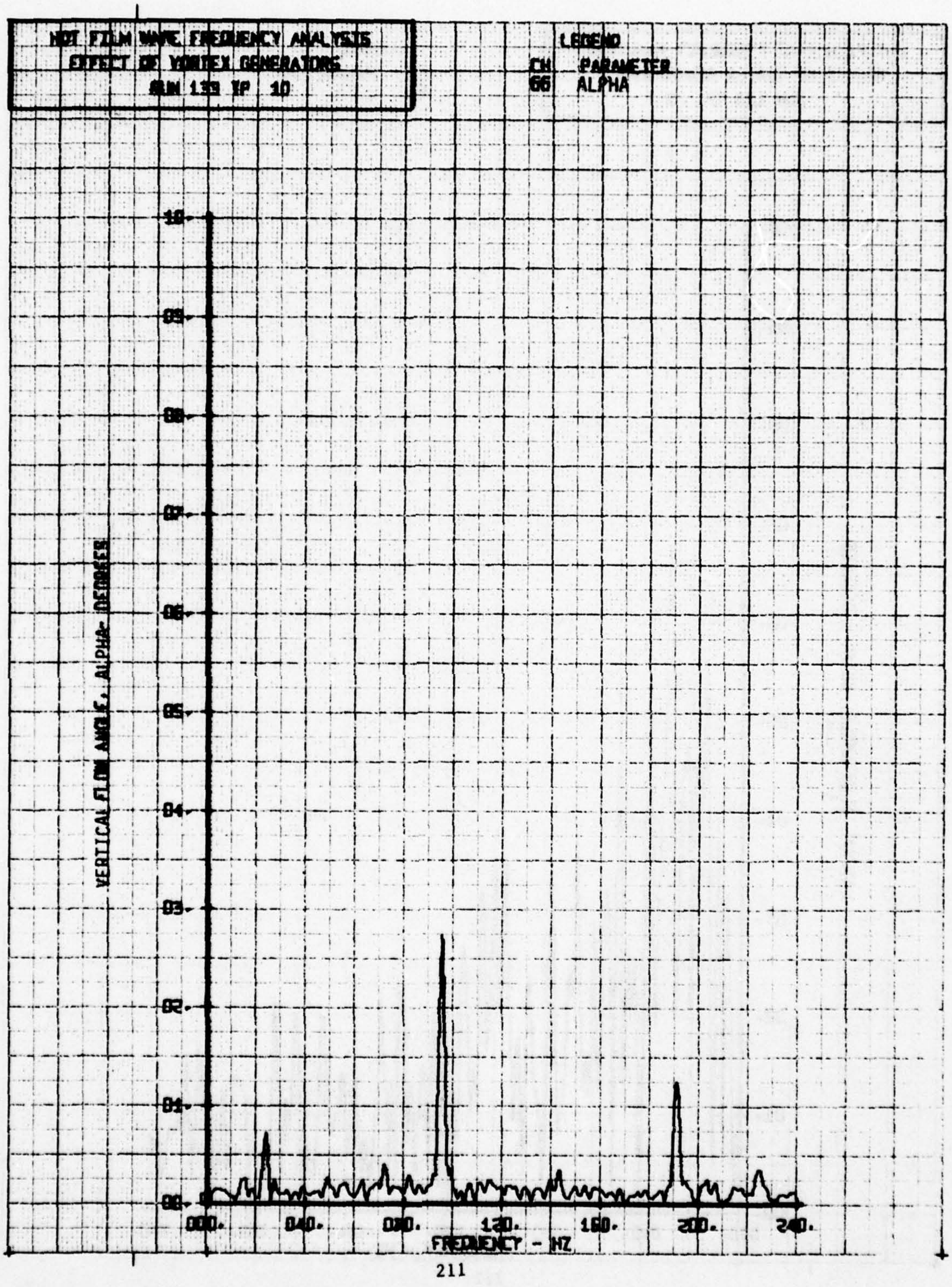
FREQUENCY - HZ


HOT FILM WAKE FREQUENCY ANALYSIS
EFFECT OF VORTEX GENERATORS
RUN 139 TP 9
LEGEND
CH PARAMETER
66 ALPHA
VERTICAL FLOW ANGLE, ALPHA- DEGREES



HOT FILM WAVE FREQUENCY ANALYSIS
EFFECT OF VORTEX GENERATORS
RUN 139 TP 10
LEGEND
CH PARAMETER
66 ALPHA
VERTICAL FLOW ANGLE, ALPHA- DEGREES
FREQUENCY - HZ
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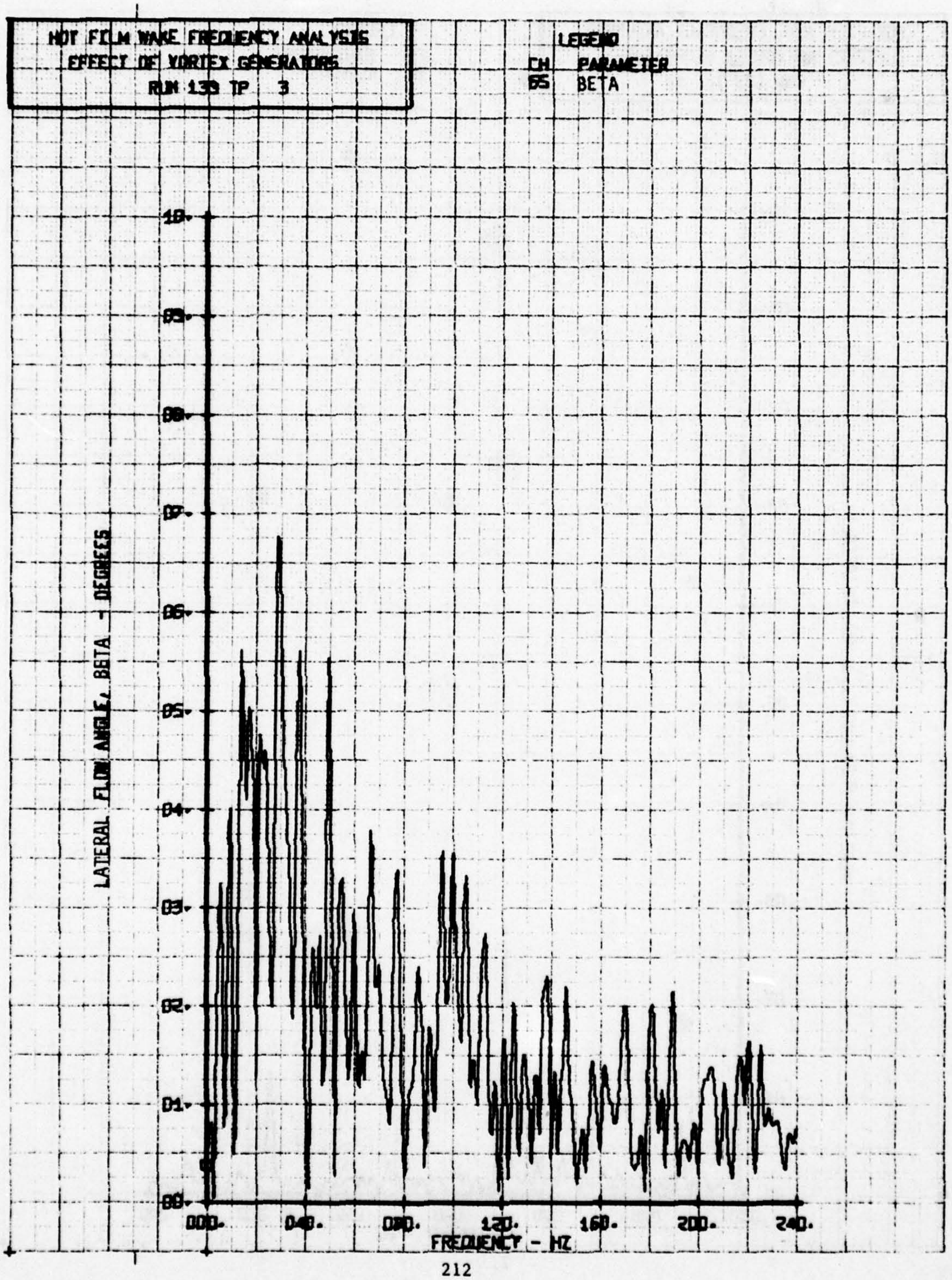
HOT FILM WAKE FREQUENCY ANALYSIS
EFFECT OF VORTEX GENERATORS
RUN 139 TP 3
LEGEND
CH PARAMETER
65 BETA
LATERAL FLOW ANGLE, BETA - DEGREES
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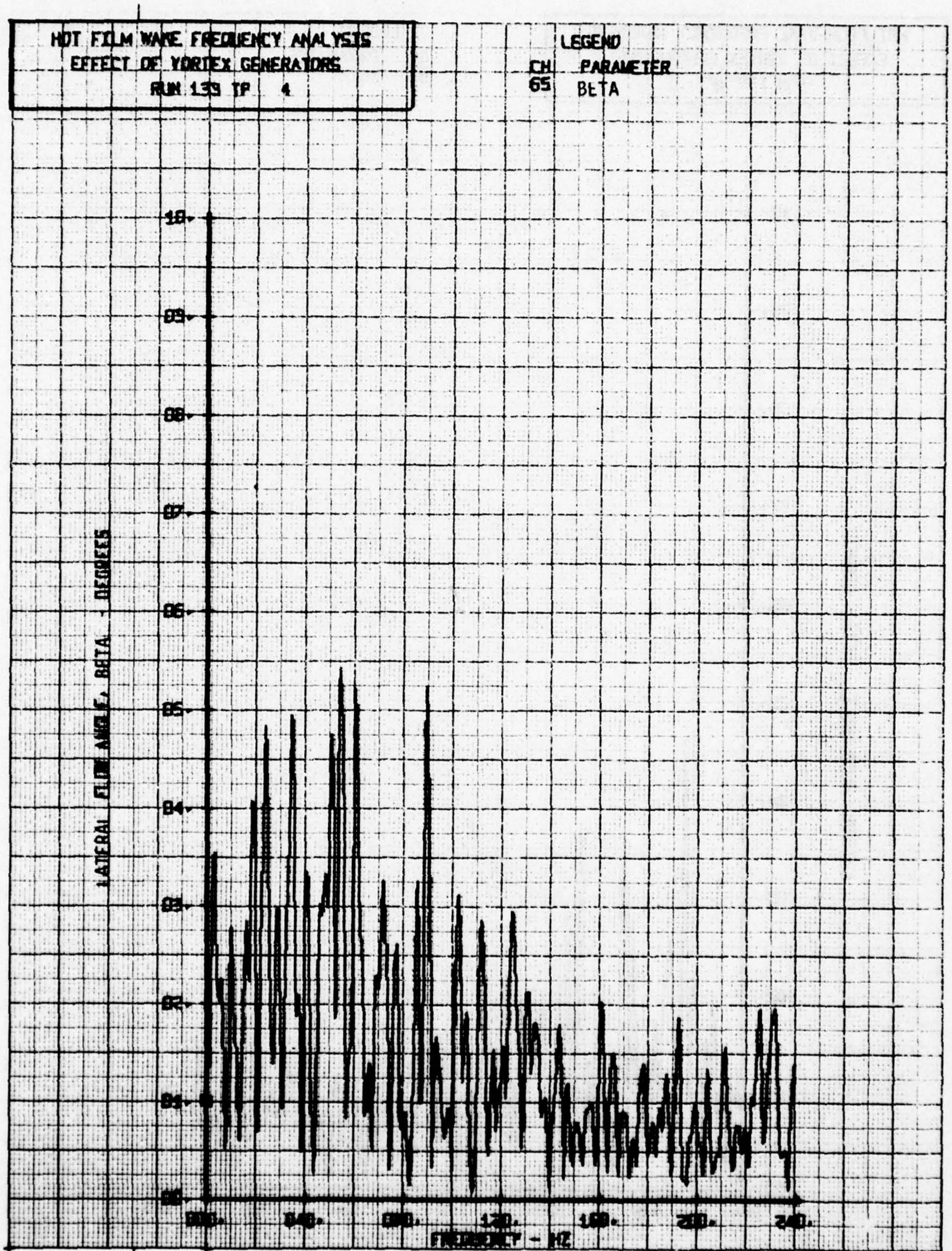
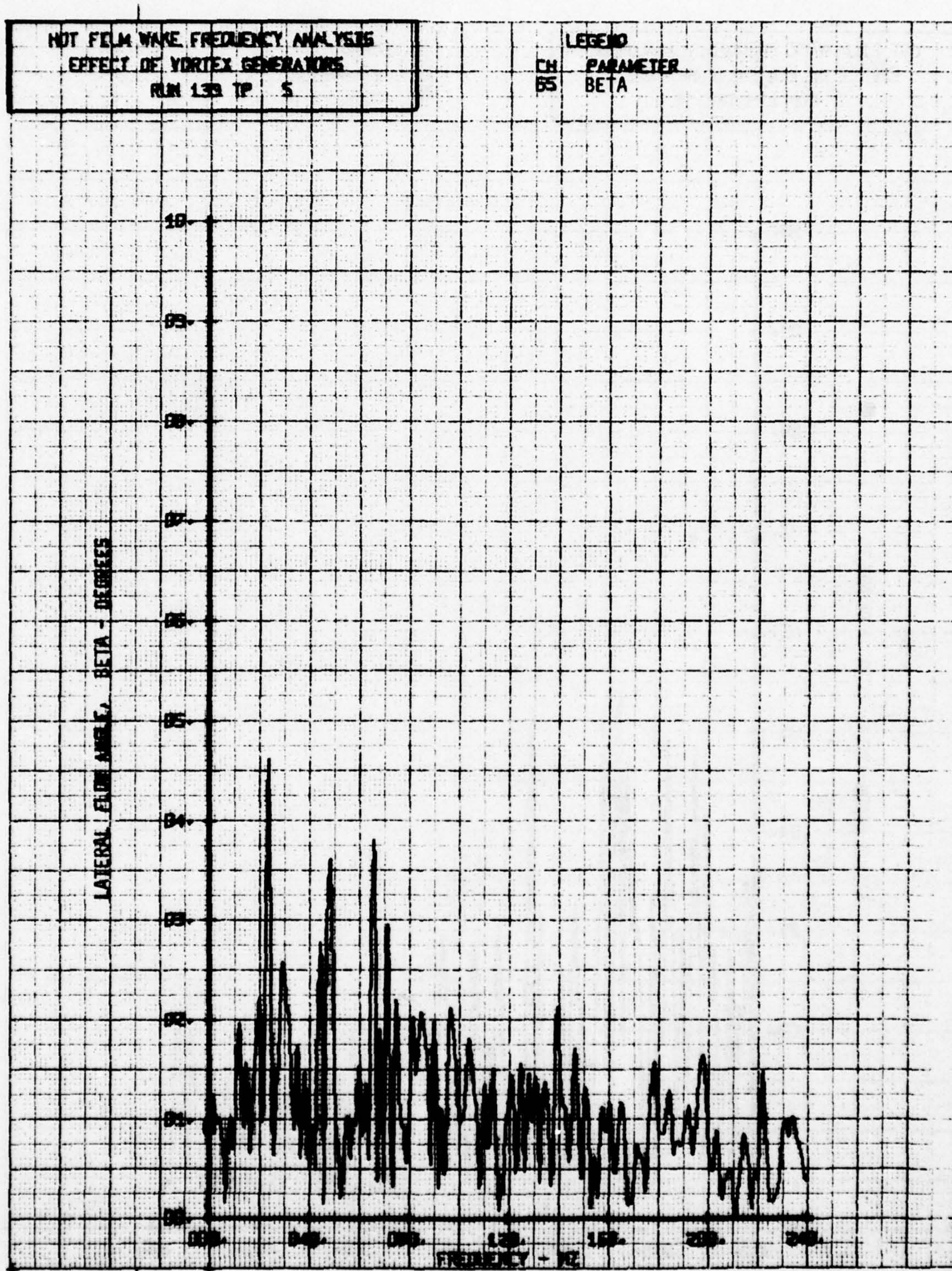
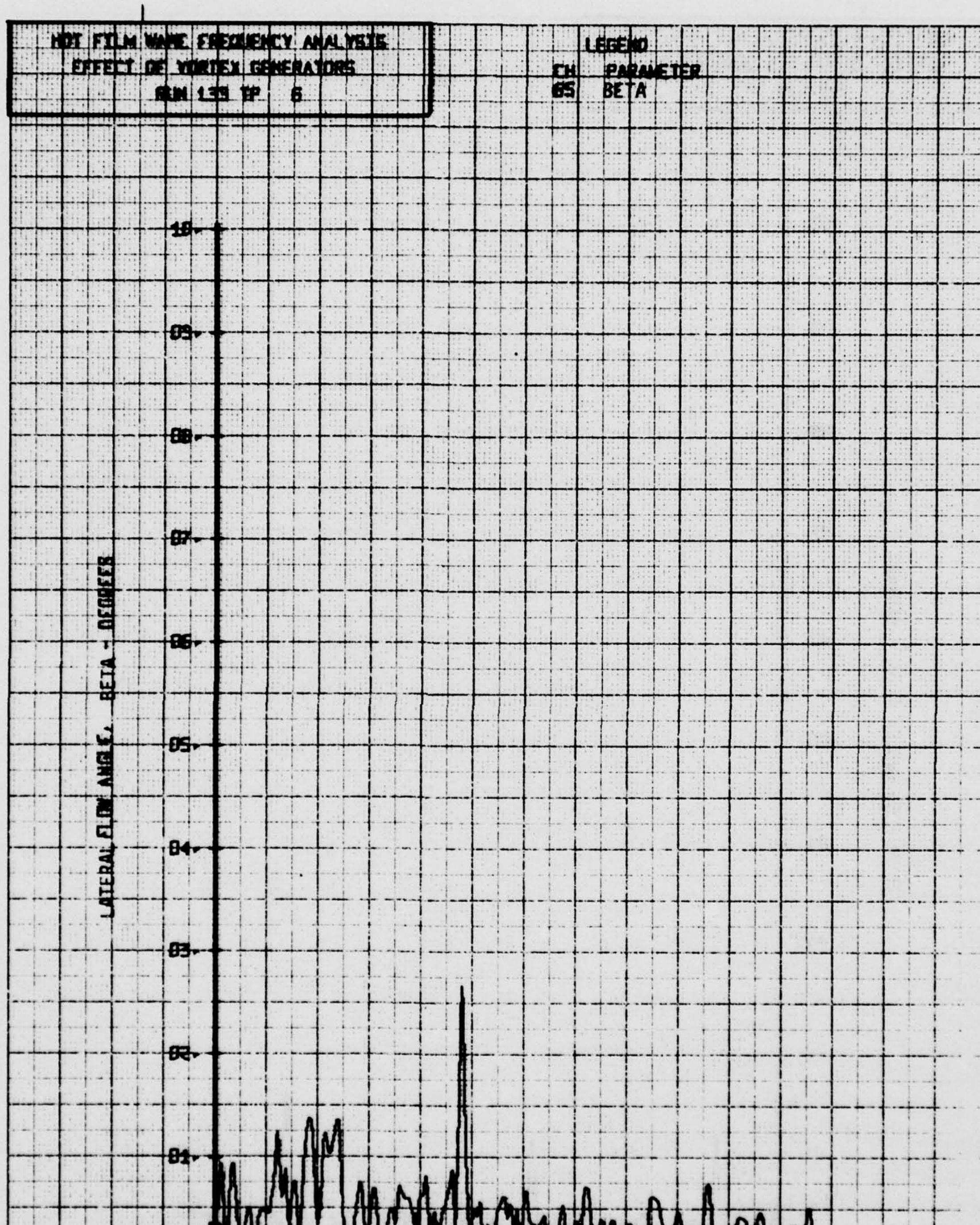
FREQUENCY - HZ

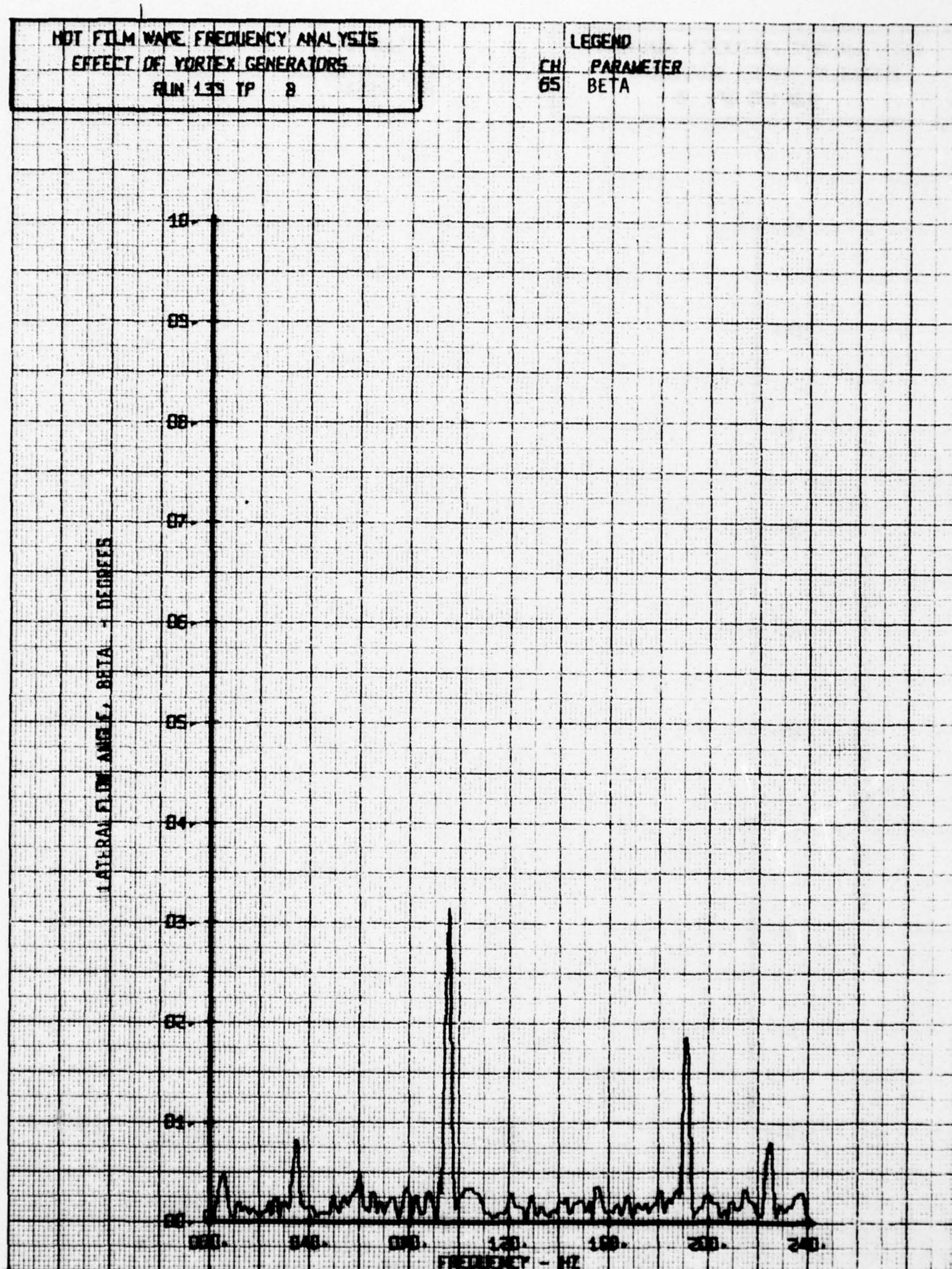


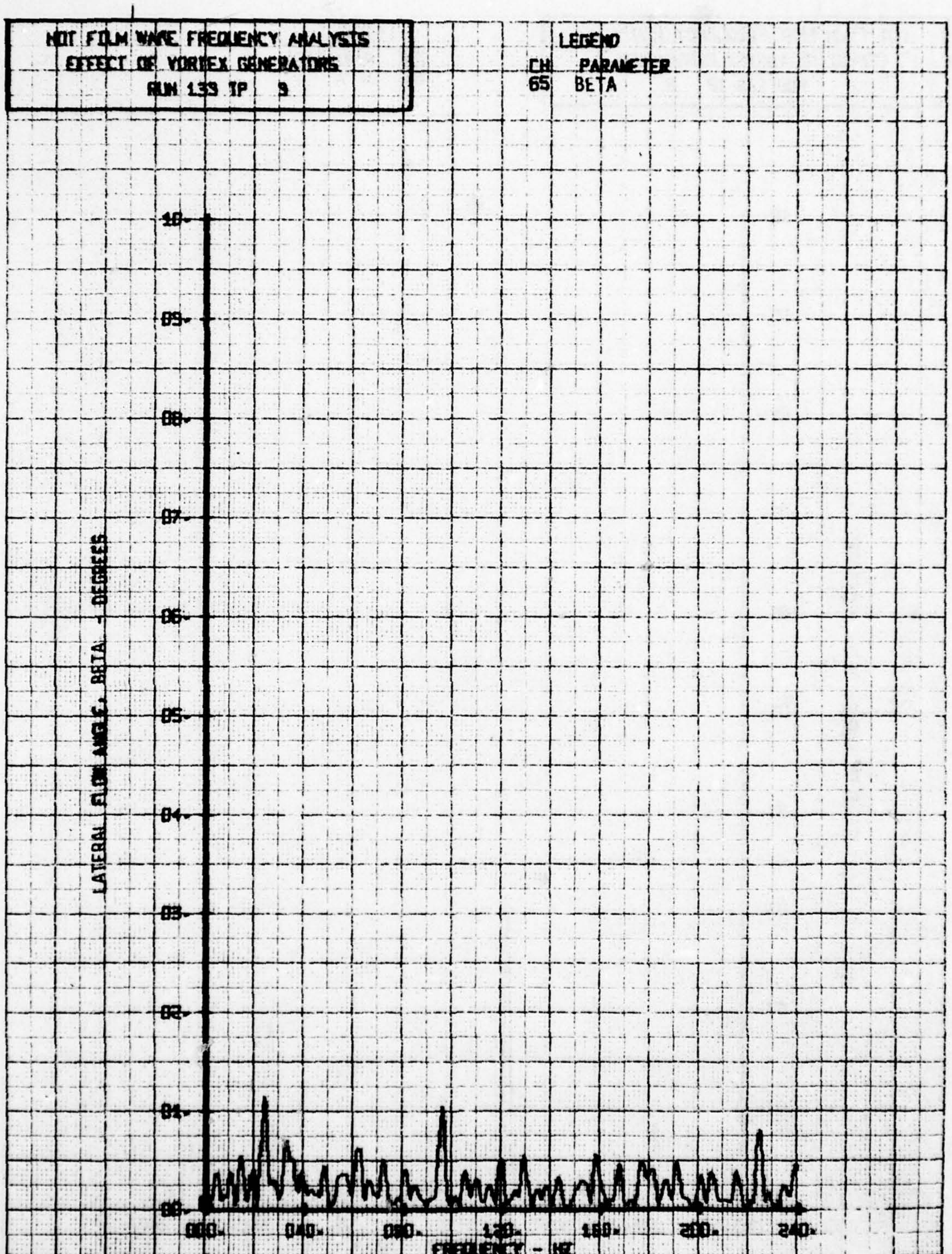
HOT FILM WAKE FREQUENCY ANALYSIS
EFFECT OF VORTEX GENERATORS
RUN 133 TP 4
LEGEND
CH PARAMETER
65 BETA
LATERAL FLOW ANGLE, BETA - DEGREES
FREQUENCY - HZ


HOT FILM WAKE FREQUENCY ANALYSIS
EFFECT OF VORTEX GENERATORS
RUN 139 TP 5
LEGEND
CH PARAMETER
65 BETA
LATERAL FLOW ANGLE, BETA - DEGREES
FREQUENCY - HZ


HOT FILM WAKE FREQUENCY ANALYSIS
EFFECT OF VORTEX GENERATORS
RUN 133 TP 6
LEGEND
CH. PARAMETER
65 BETA
LATERAL FLOW ANGLE, BETA - DEGREES
FREQUENCY - HZ


HOT FILM WAKE FREQUENCY ANALYSIS
EFFECT OF VORTEX GENERATORS
RUN 133 TP 7
LEGEND
CH PARAMETER
65 BETA
LATERAL FLOW ANGLE, BETA - DEGREES
FREQUENCY - HZ


HOT FILM WAKE FREQUENCY ANALYSIS
EFFECT OF VORTEX GENERATORS
RUN 133 TP 8
LEGEND
CH PARAMETER
65 BETA
LATERAL FLOW ANGLE, BETA - DEGREES
FREQUENCY - HZ


HOT FILM WAKE FREQUENCY ANALYSIS
EFFECT OF VORTEX GENERATORS
RUN 133 TP 9
LEGEND
CH PARAMETER
65 BETA
LATERAL FLOW ANGLE, BETA - DEGREES
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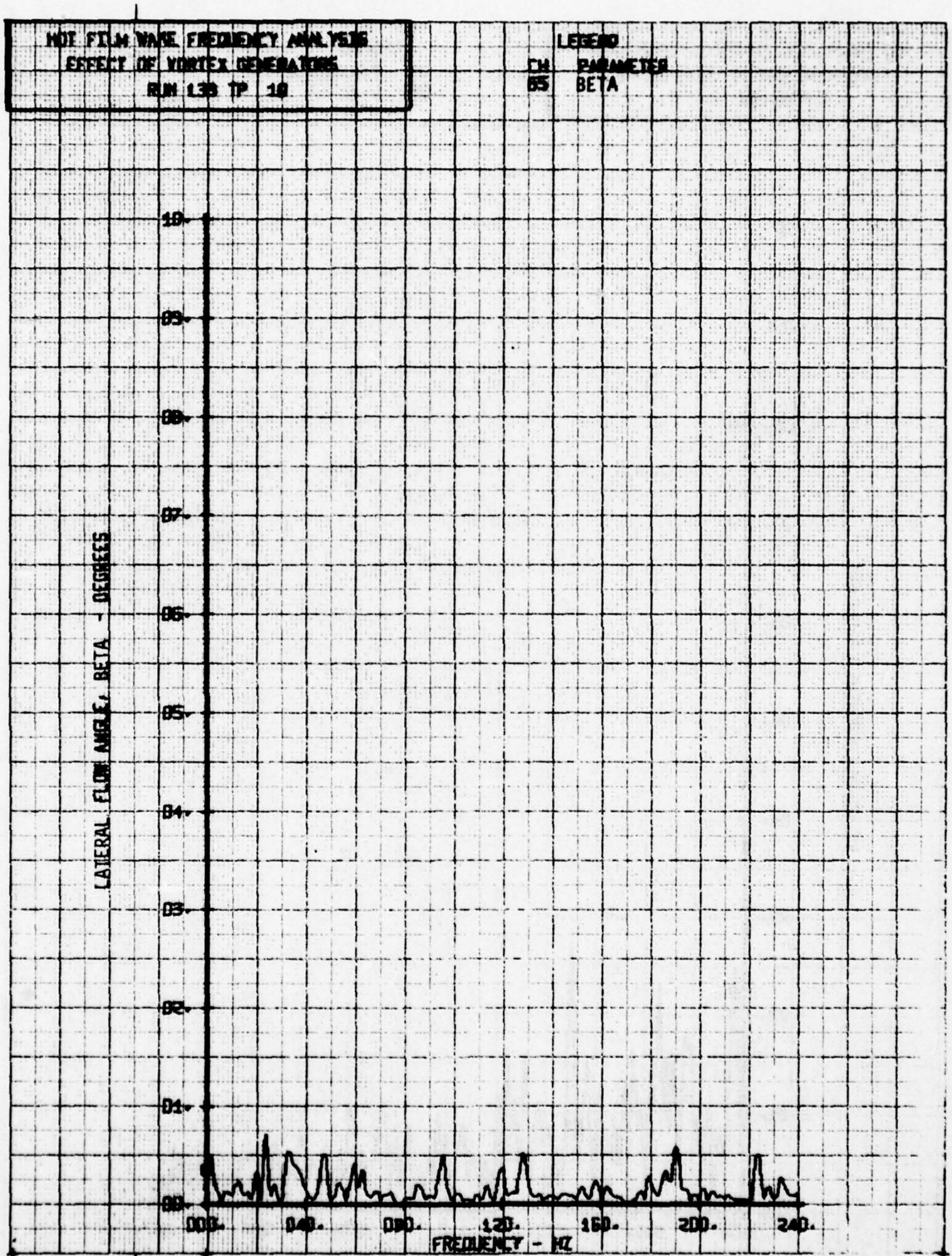
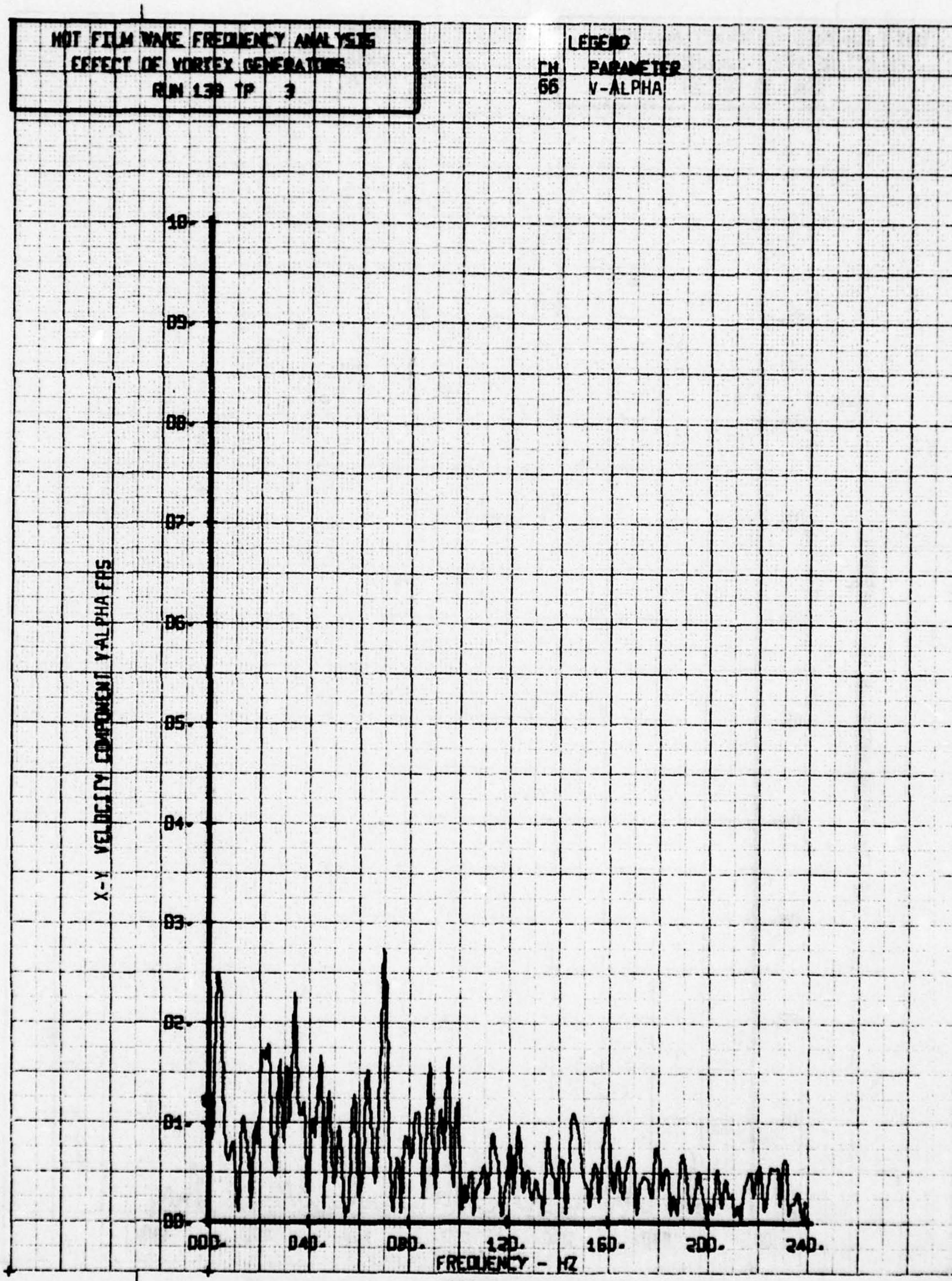
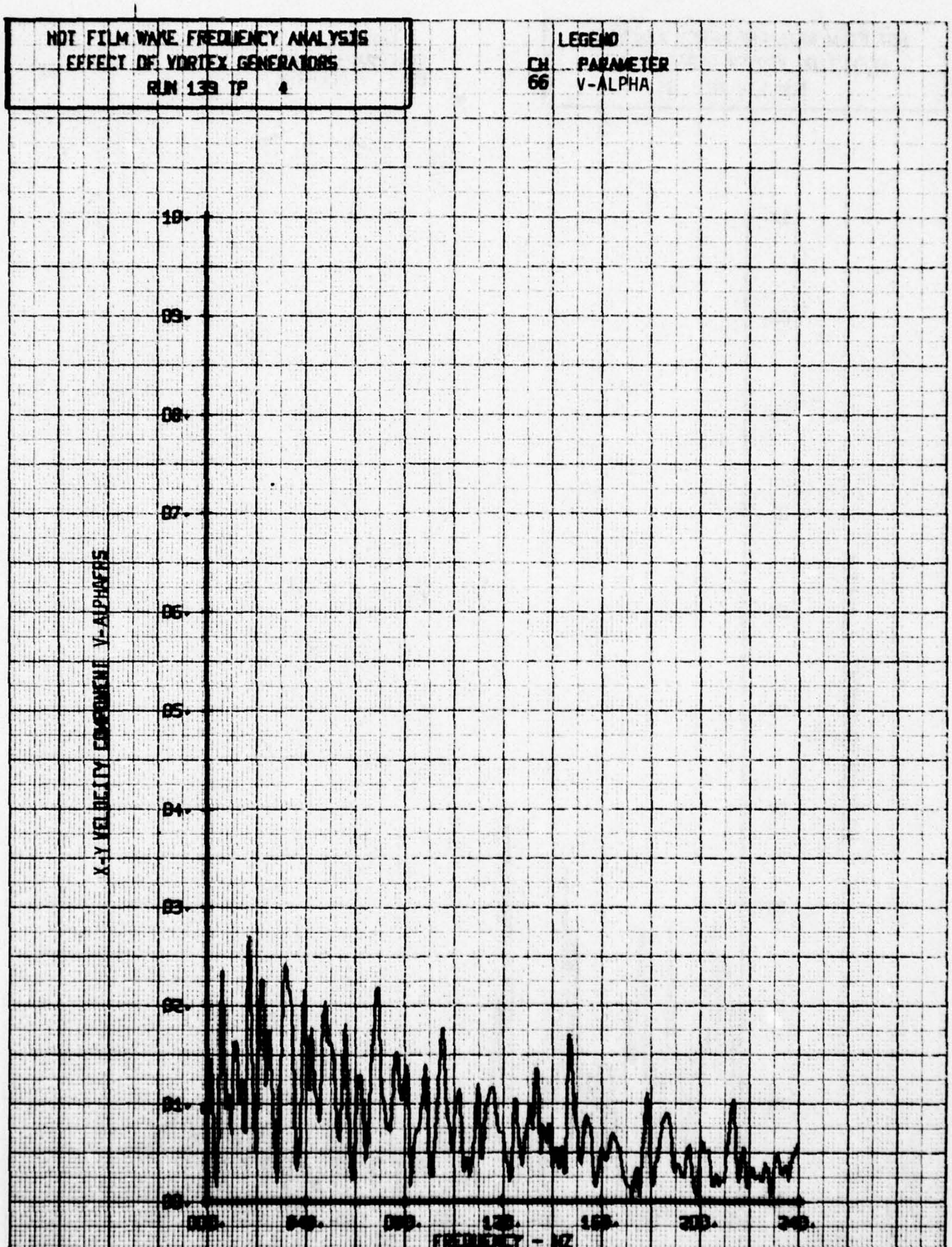
FREQUENCY - HZ



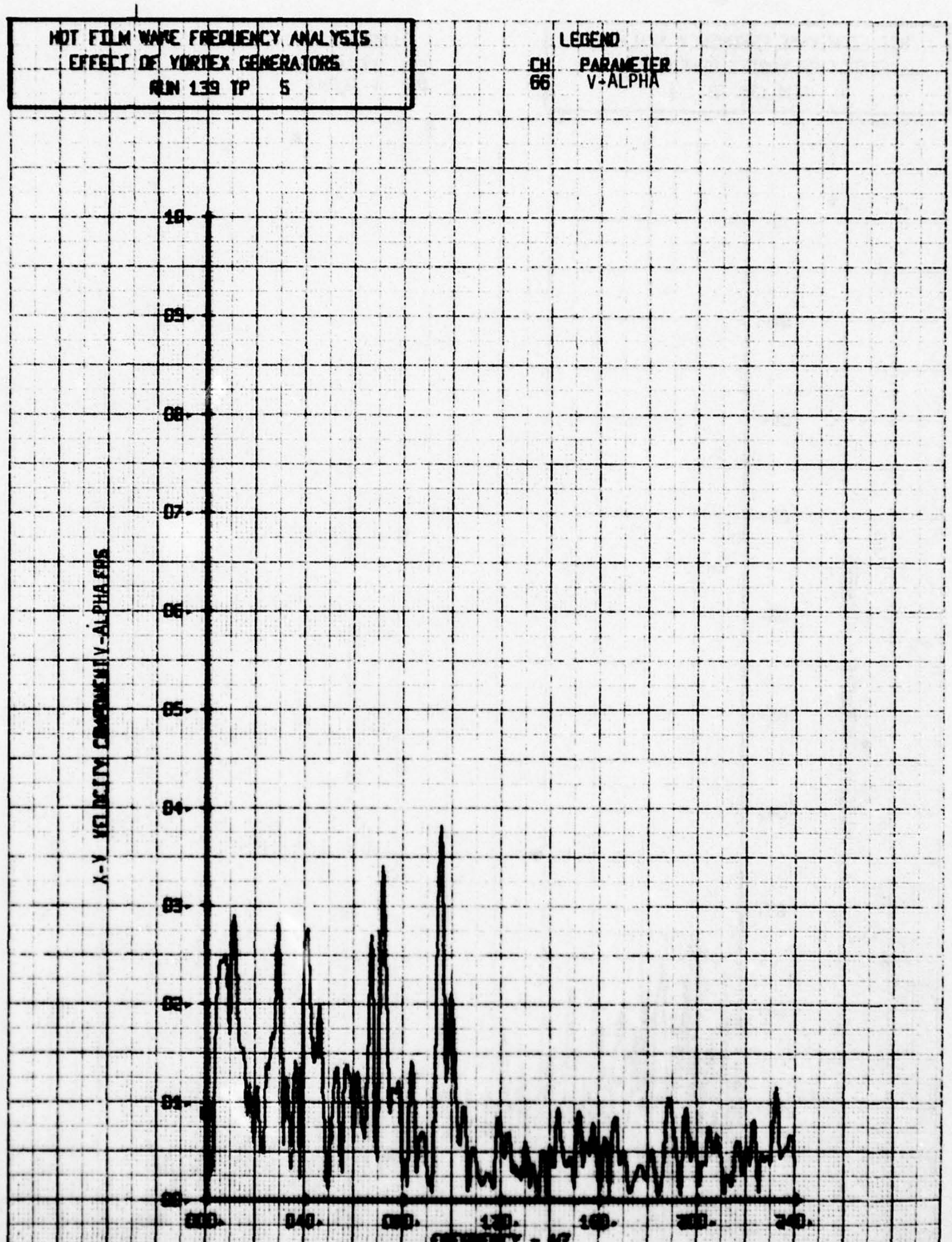
HOT FILM WAKE FREQUENCY ANALYSIS
EFFECT OF VORTEX GENERATORS
RUN 138 TP 10
LEGEND
CH PARAMETER
65 BETA
LATERAL FLOW ANGLE, BETA - DEGREES
FREQUENCY - HZ



HOT FILM WAKE FREQUENCY ANALYSIS
EFFECT OF VORTEX GENERATORS
RUN 138 TP 3
LEGEND
CH PARAMETER
66 V-ALPHA
X-Y VELOCITY COMPONENT V-ALPHA FPS
FREQUENCY - HZ



HOT FILM WAKE FREQUENCY ANALYSIS
EFFECT OF VORTEX GENERATORS
RUN 139 TP 4
LEGEND
CH PARAMETER
66 V-ALPHA
X-Y VELOCITY COMPONENT V-ALPHAFS
FREQUENCY - HZ



HOT FILM WAKE FREQUENCY ANALYSIS
EFFECT OF VORTEX GENERATORS
RUN 139 TP 5
LEGEND
CH PARAMETER
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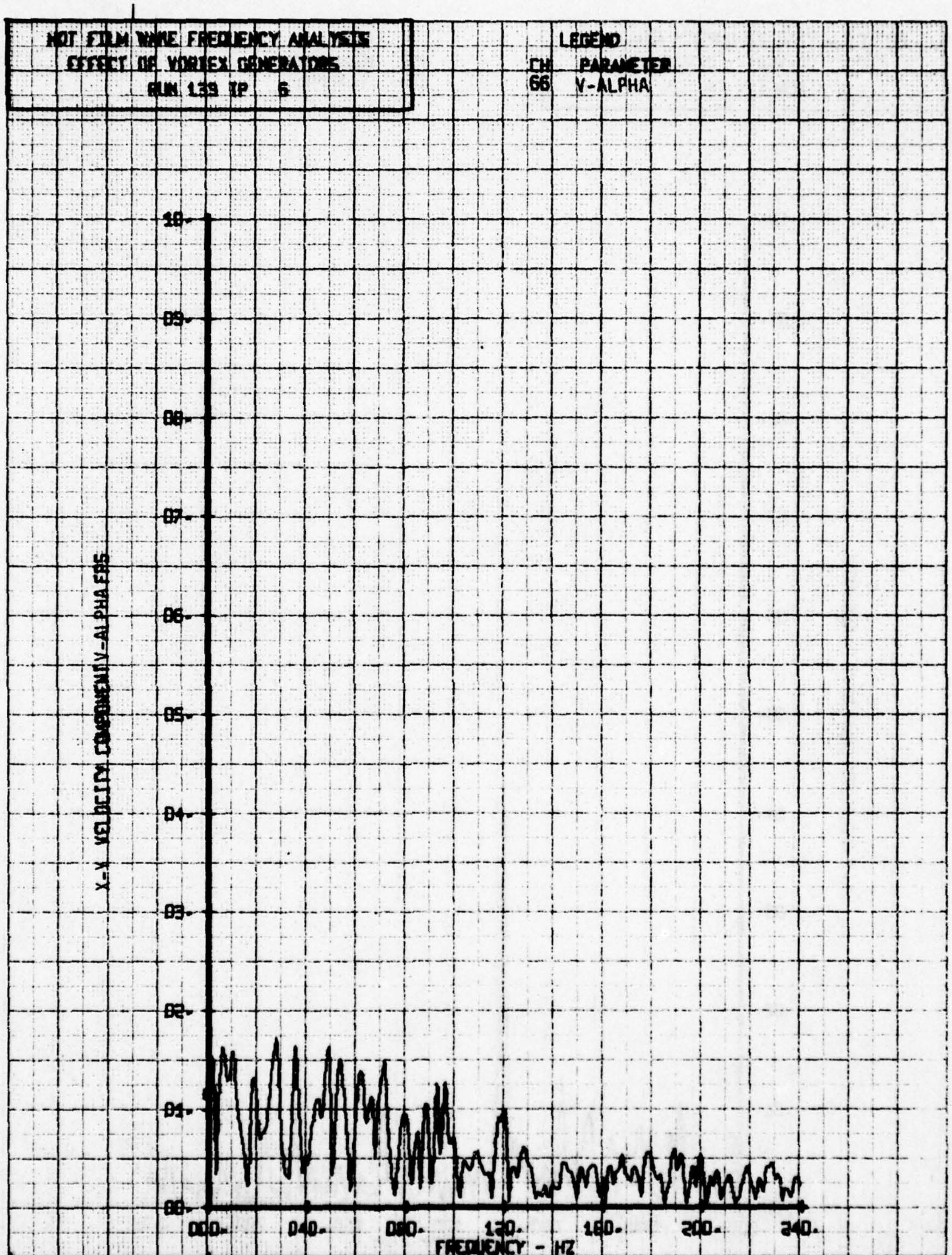
X-V VELOCITY COMPONENT V-ALPHA FPS
FREQUENCY - HZ


HOT FILM WAKE FREQUENCY ANALYSIS
EFFECT OF VORTEX GENERATORS
RUN 139 IP 6
LEGEND
CH PARAMETER
66 V-ALPHA
X-V VELOCITY COMPONENT V-ALPHA FPS
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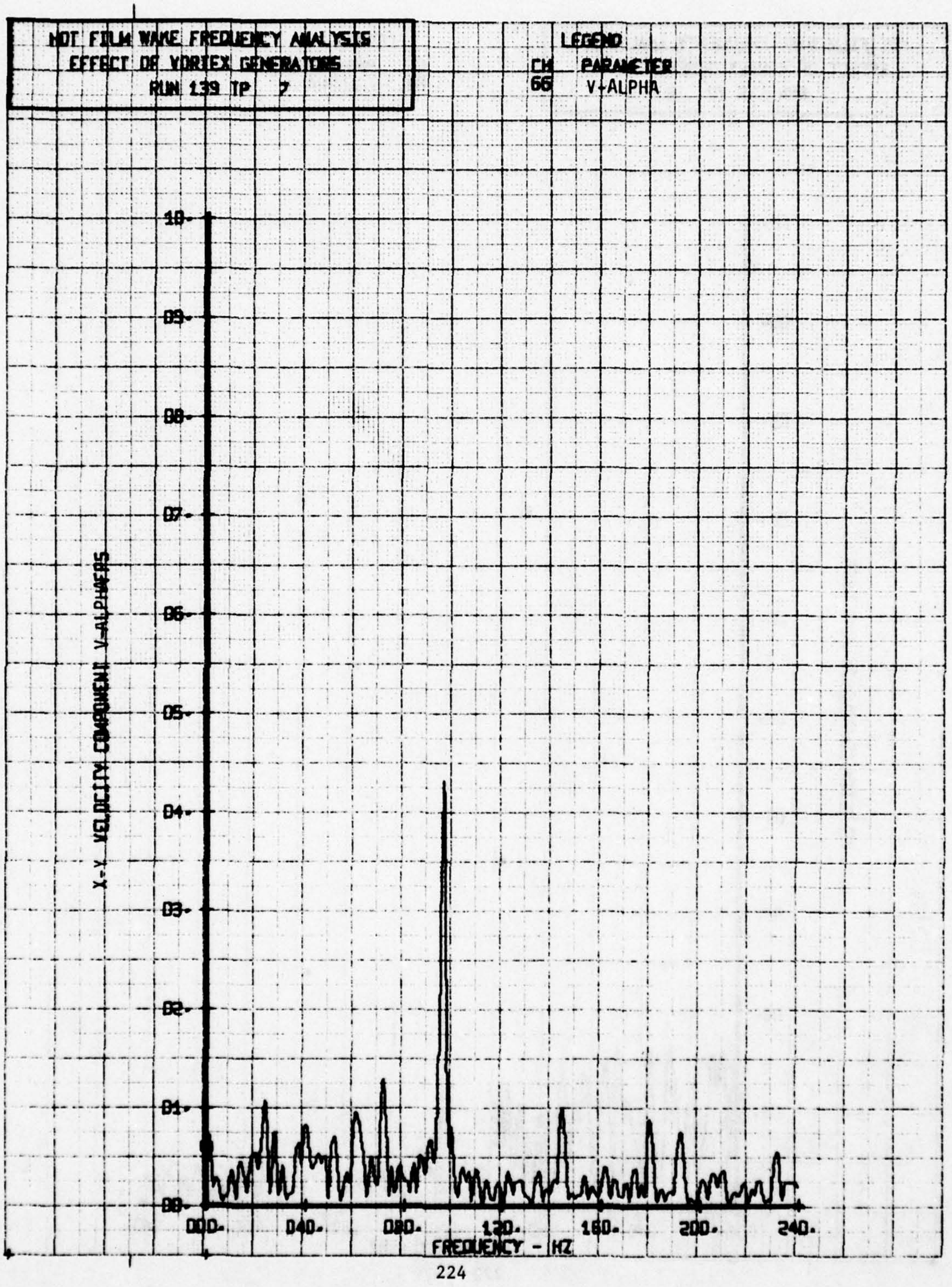
FREQUENCY - HZ


HOT FILM WAKE FREQUENCY ANALYSIS
EFFECT OF VORTEX GENERATORS
RUN 139 TP 7
LEGEND
CH PARAMETER
66 V-ALPHA
X-Y VELOCITY COMPONENT V-ALPHAFS
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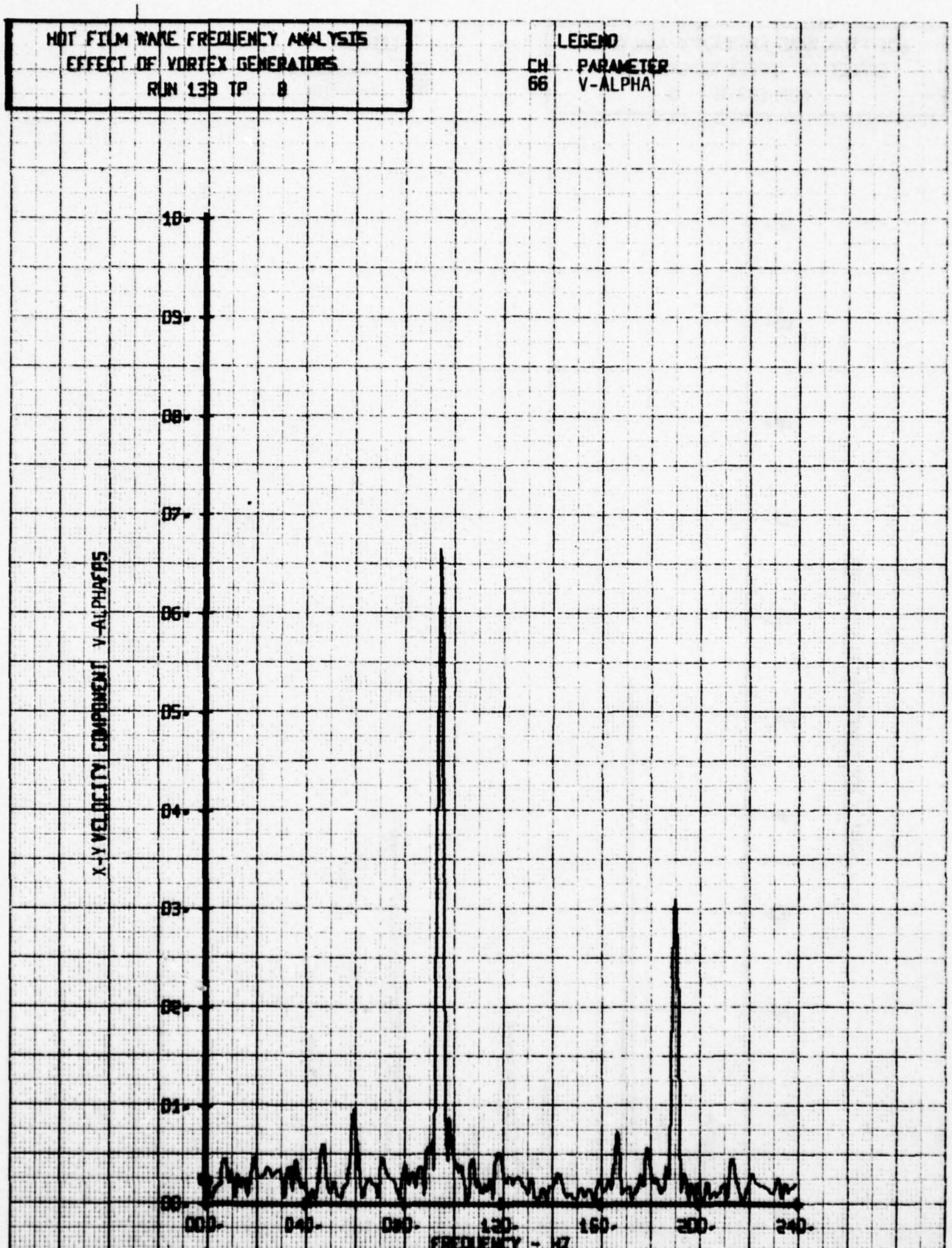
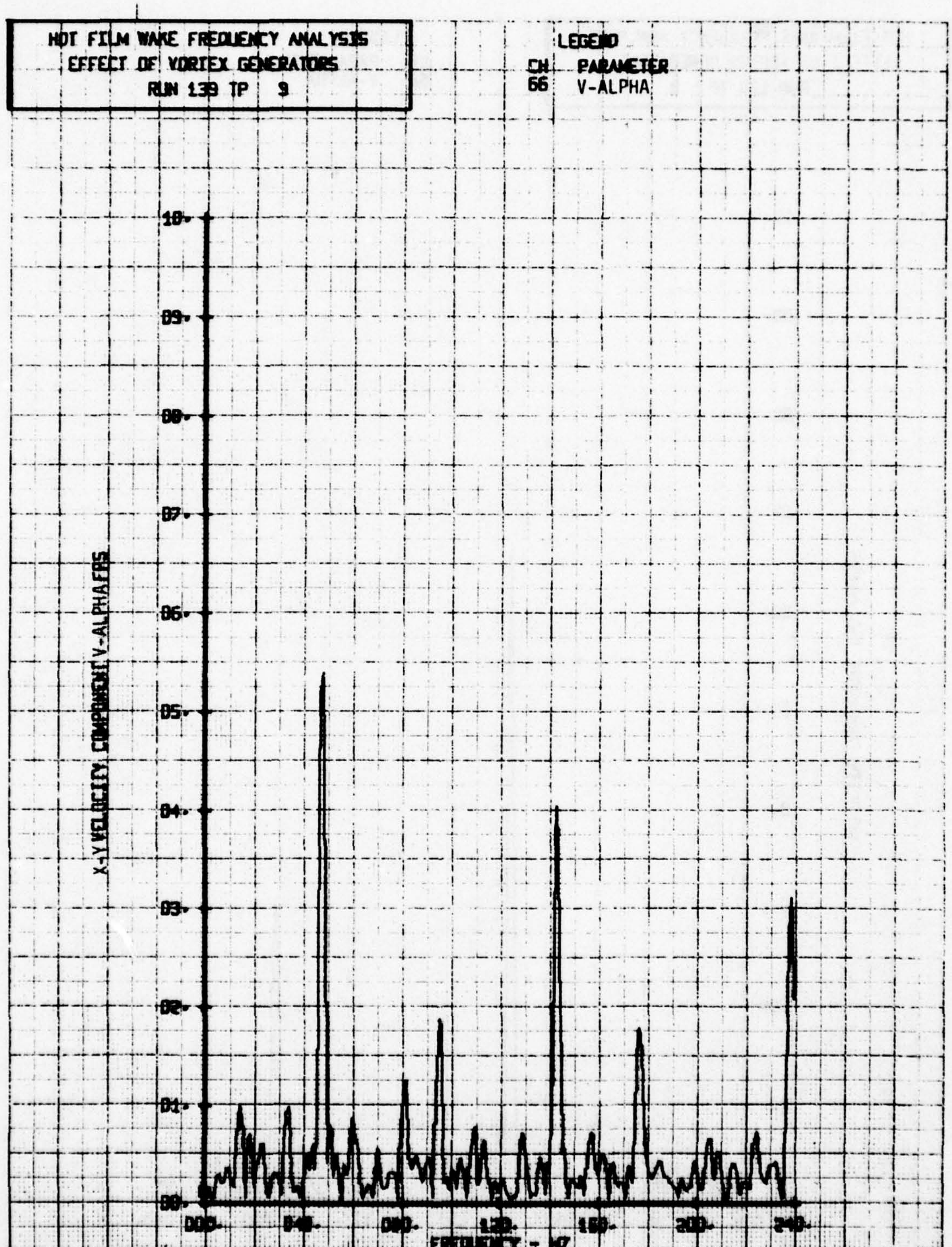
FREQUENCY - HZ



HOT FILM WAKE FREQUENCY ANALYSIS
EFFECT OF VORTEX GENERATORS
RUN 139 TP 8
LEGEND
CH PARAMETER
66 V-ALPHA
X-Y VELOCITY COMPONENT V-ALPHAFPS
FREQUENCY ~ HZ


HOT FILM WAKE FREQUENCY ANALYSIS
EFFECT OF VORTEX GENERATORS
RUN 139 TP 9
LEGEND
CH PARAMETER
66 V-ALPHA
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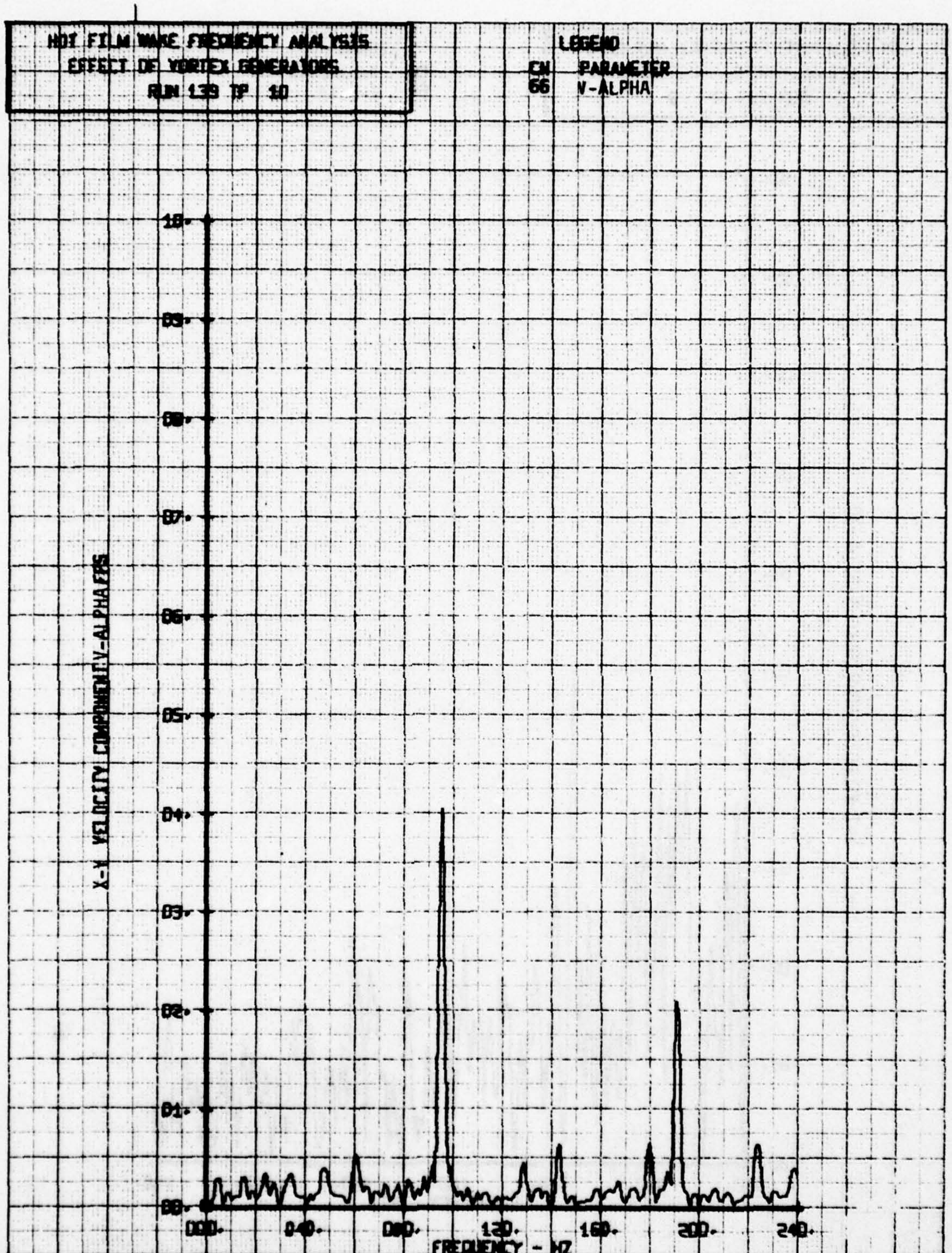
FREQUENCY - HZ



HOT FILM WAKE FREQUENCY ANALYSIS
EFFECT OF VORTEX GENERATORS
RUN 139 TP 10
LEGEND
CN PARAMETER
66 V-ALPHA
X-Y VELOCITY COMPONENT:V-ALPHA,FPS
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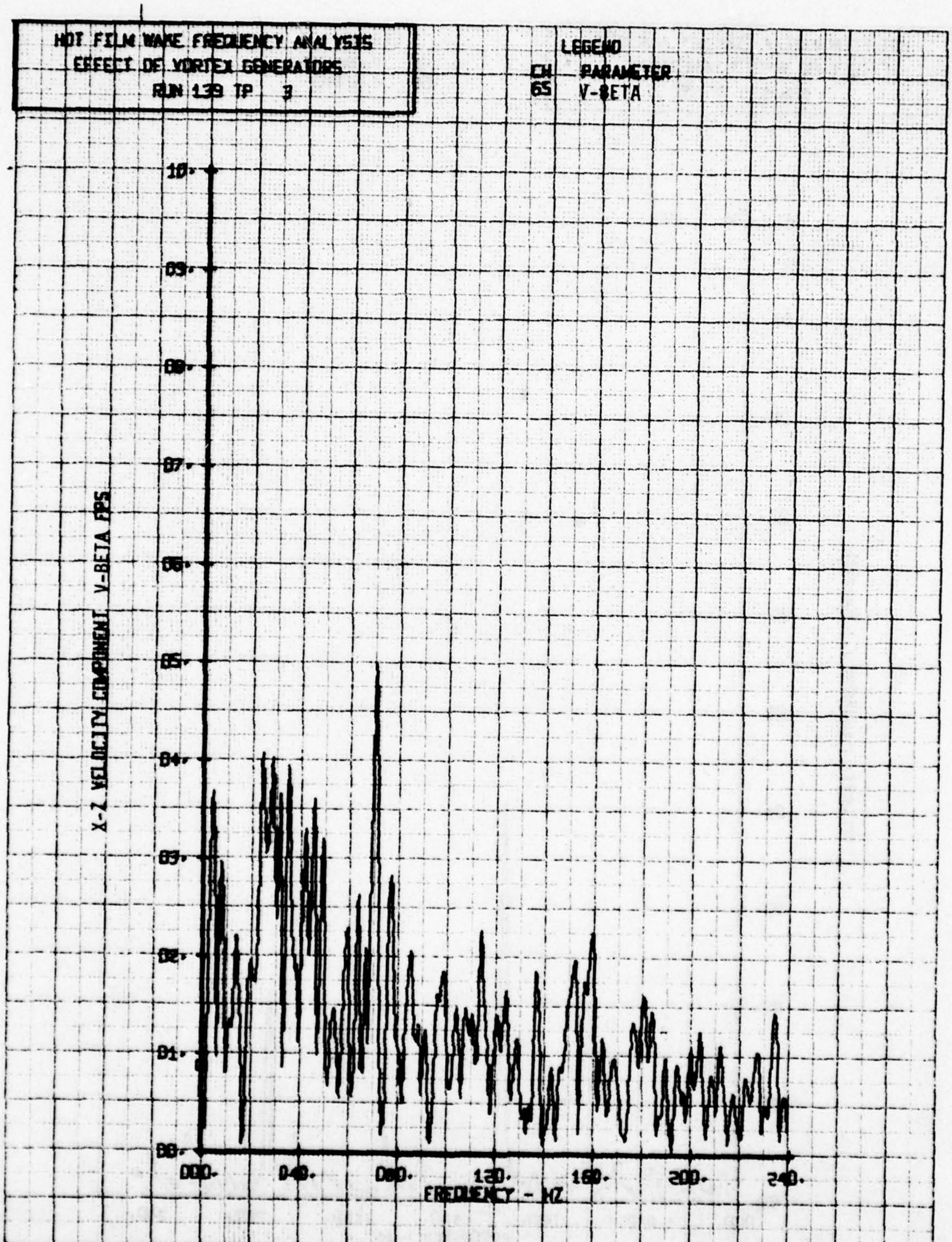
FREQUENCY - HZ


HOT FILM WAKE FREQUENCY ANALYSIS
EFFECT OF VORTEX GENERATORS
RUN 139 TP 3
LEGEND
CH PARAMETER
65 V-BETA
X-Z VELOCITY COMPONENT V-BETA FPS
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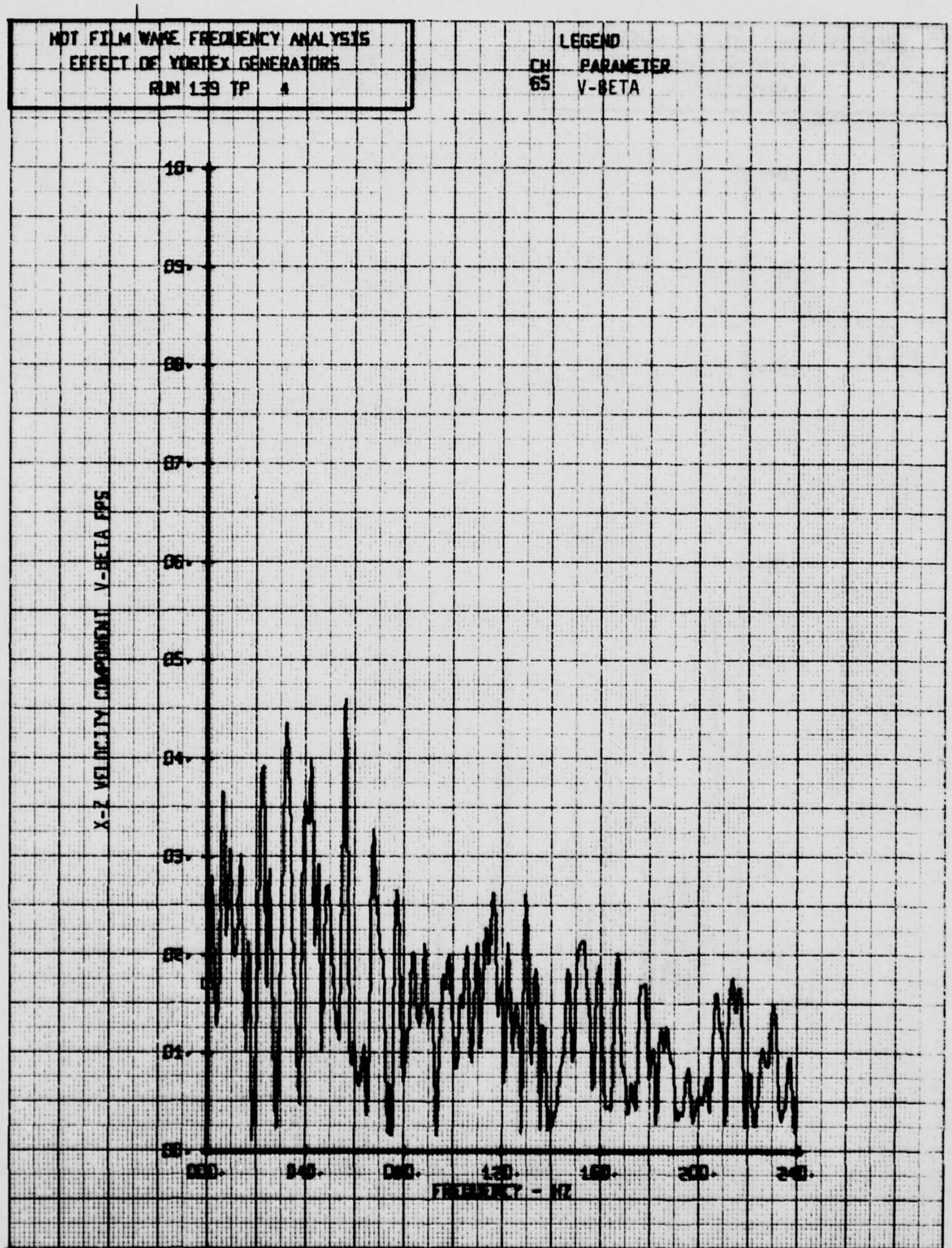
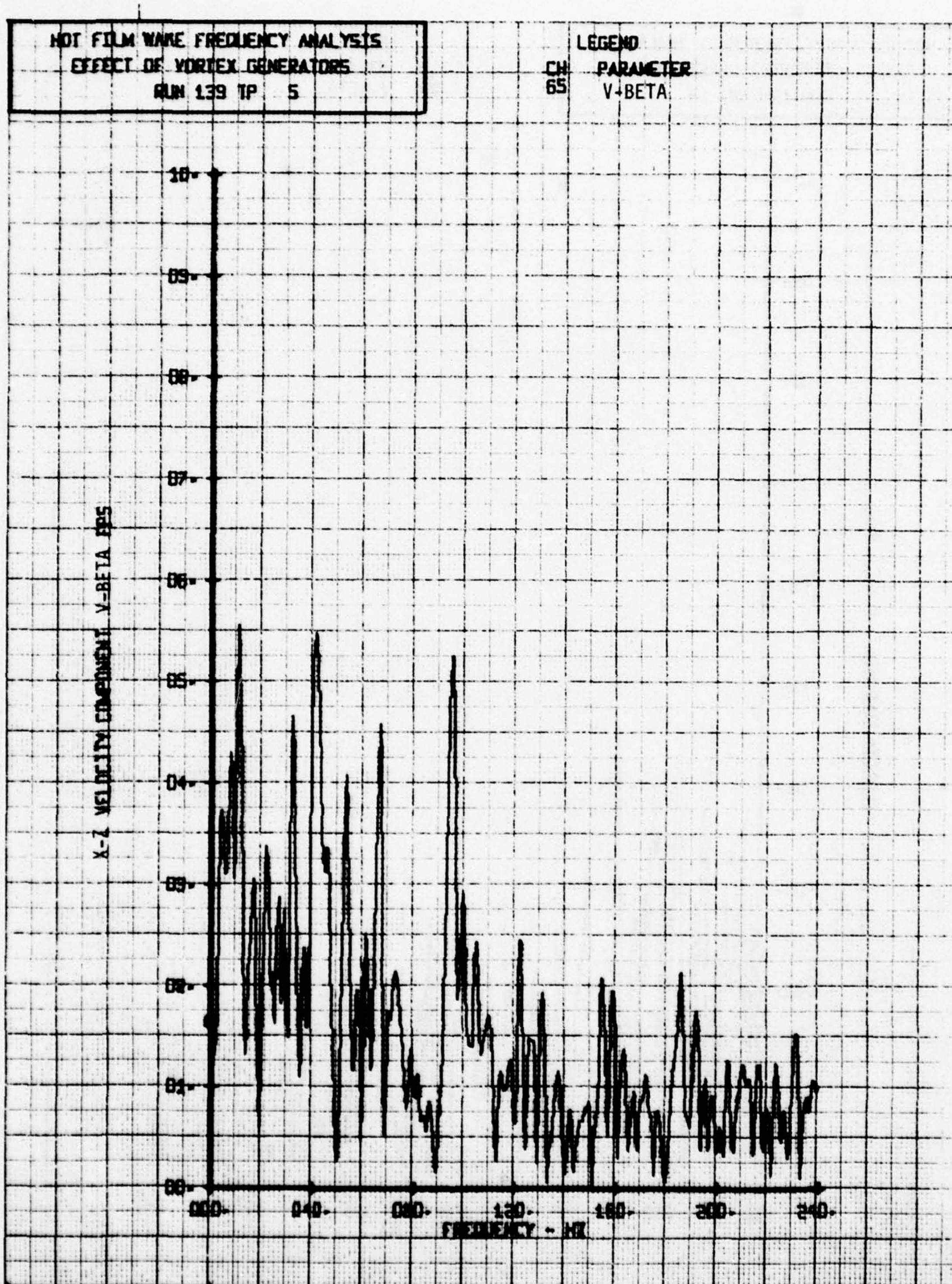
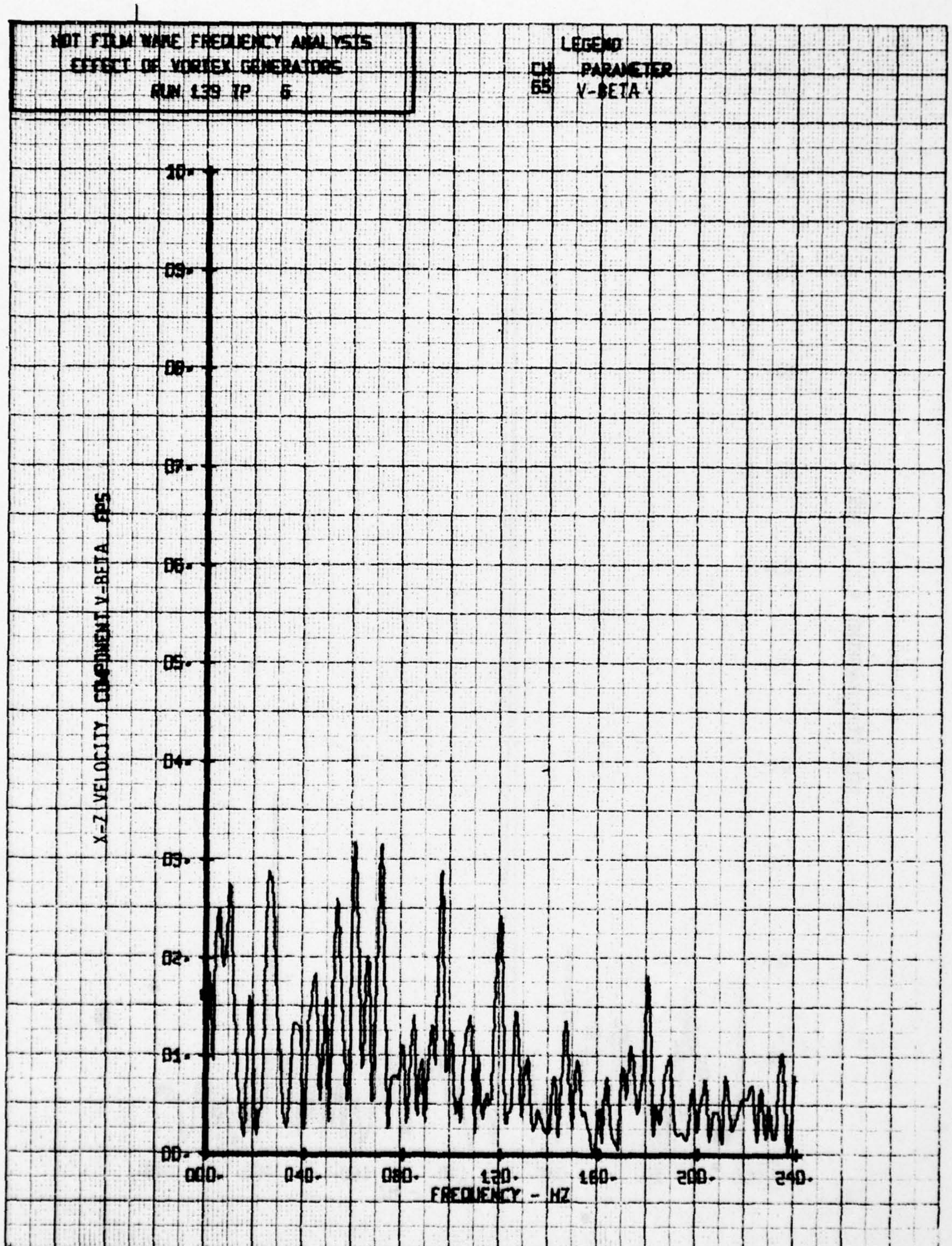
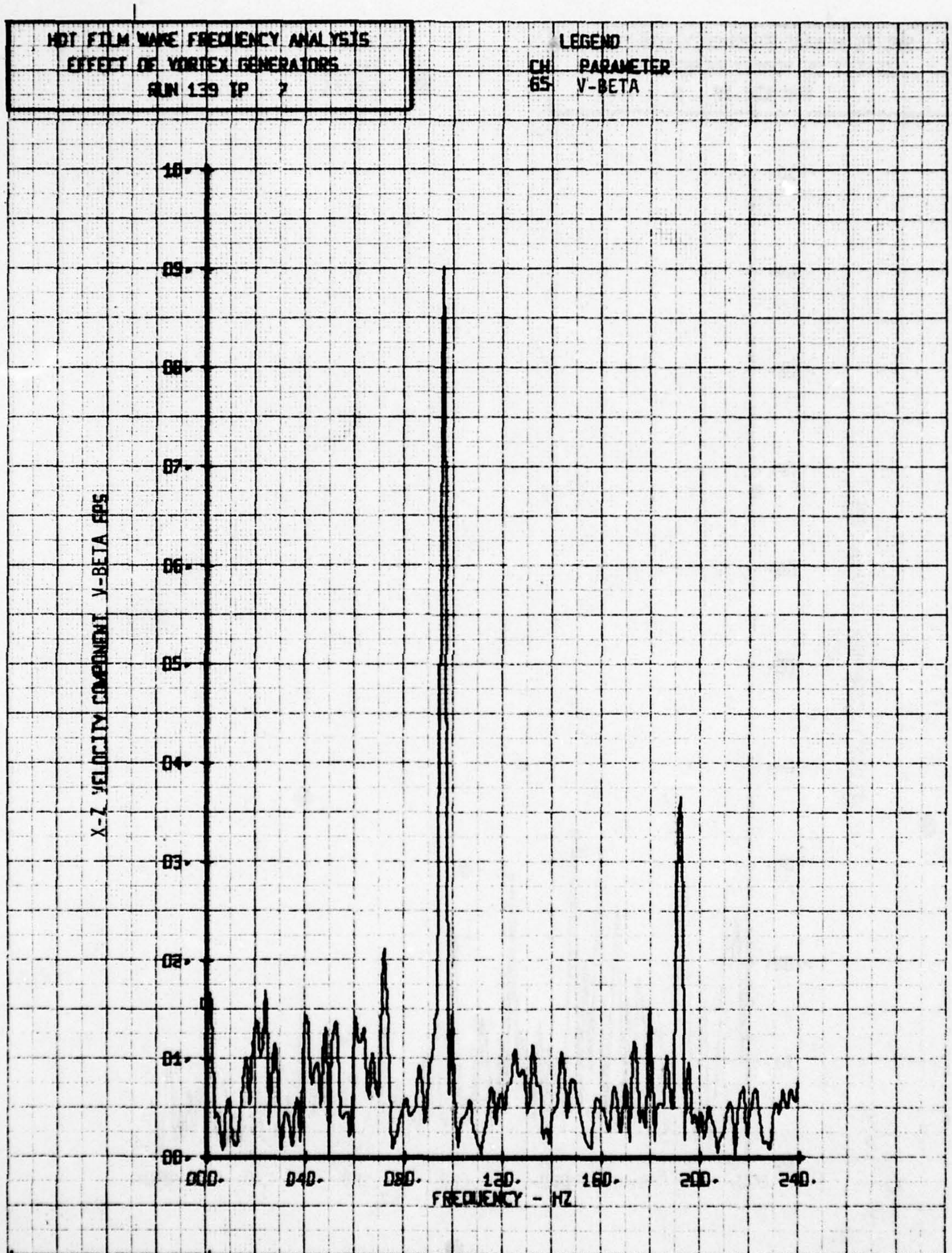
FREQUENCY - HZ



HOT FILM WAKE FREQUENCY ANALYSIS
EFFECT OF VORTEX GENERATORS
RUN 139 TP 4
LEGEND
CH PARAMETER
65 V-BETA
X-Z VELOCITY COMPONENT V-BETA FPS
FREQUENCY - HZ


HOT FILM WAKE FREQUENCY ANALYSIS
EFFECT OF VORTEX GENERATORS
RUN 139 TP 5
LEGEND
CH PARAMETER
65 V+BETA
X-Z VELOCITY COMPONENT V-BETA RMS
FREQUENCY - HZ


HOT FILM WAKE FREQUENCY ANALYSIS
EFFECT OF VORTEX GENERATORS
RUN 139 TP 6
LEGEND
CH PARAMETER
65 V-BETA
X-Z VELOCITY COMPONENT V-BETA FPS
FREQUENCY - HZ


HOT FILM WAKE FREQUENCY ANALYSIS
EFFECT OF VORTEX GENERATORS
RUN 139 TP 7
LEGEND
CH PARAMETER
65 V-BETA
X-Z VELOCITY COMPONENT V-BETA RPS
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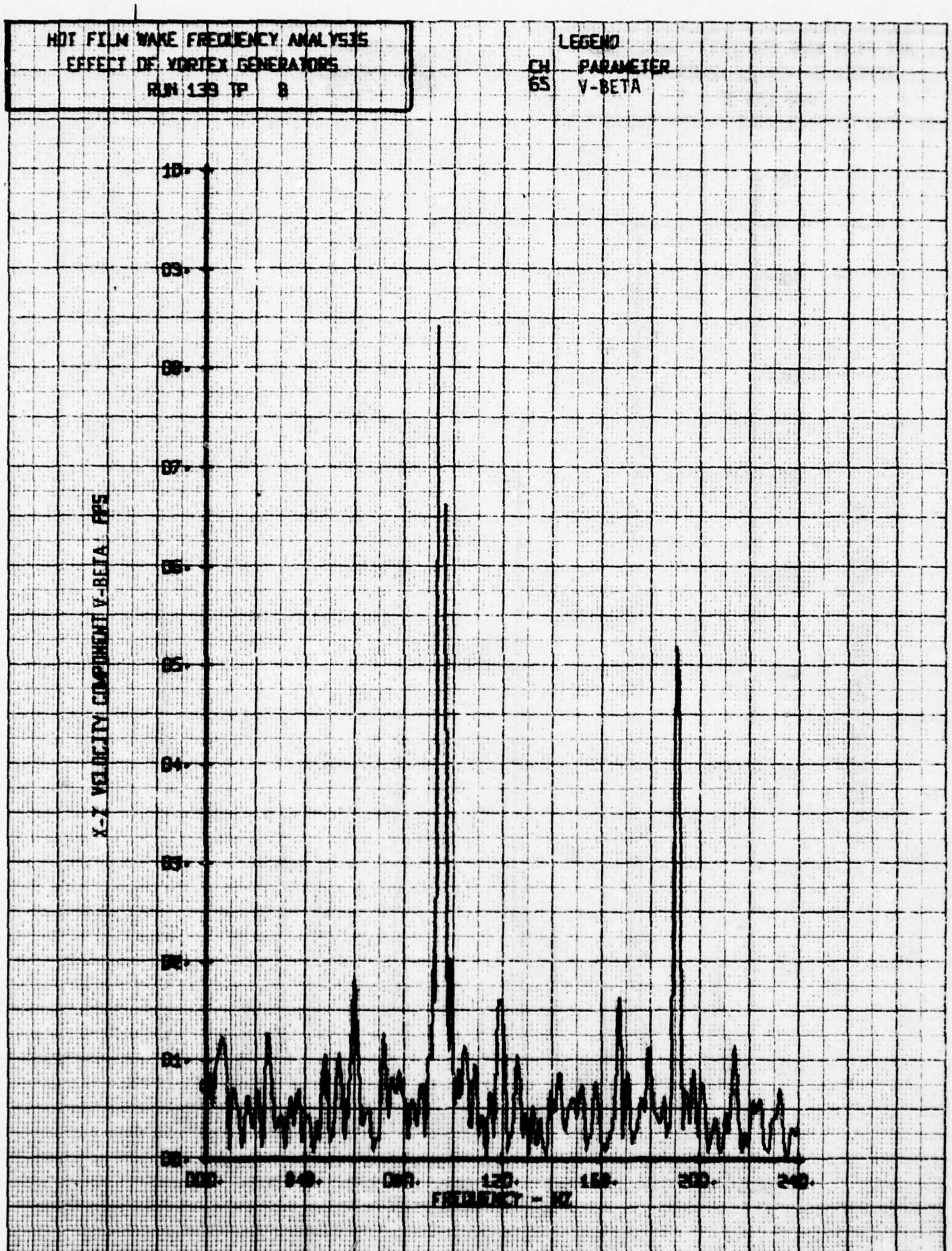
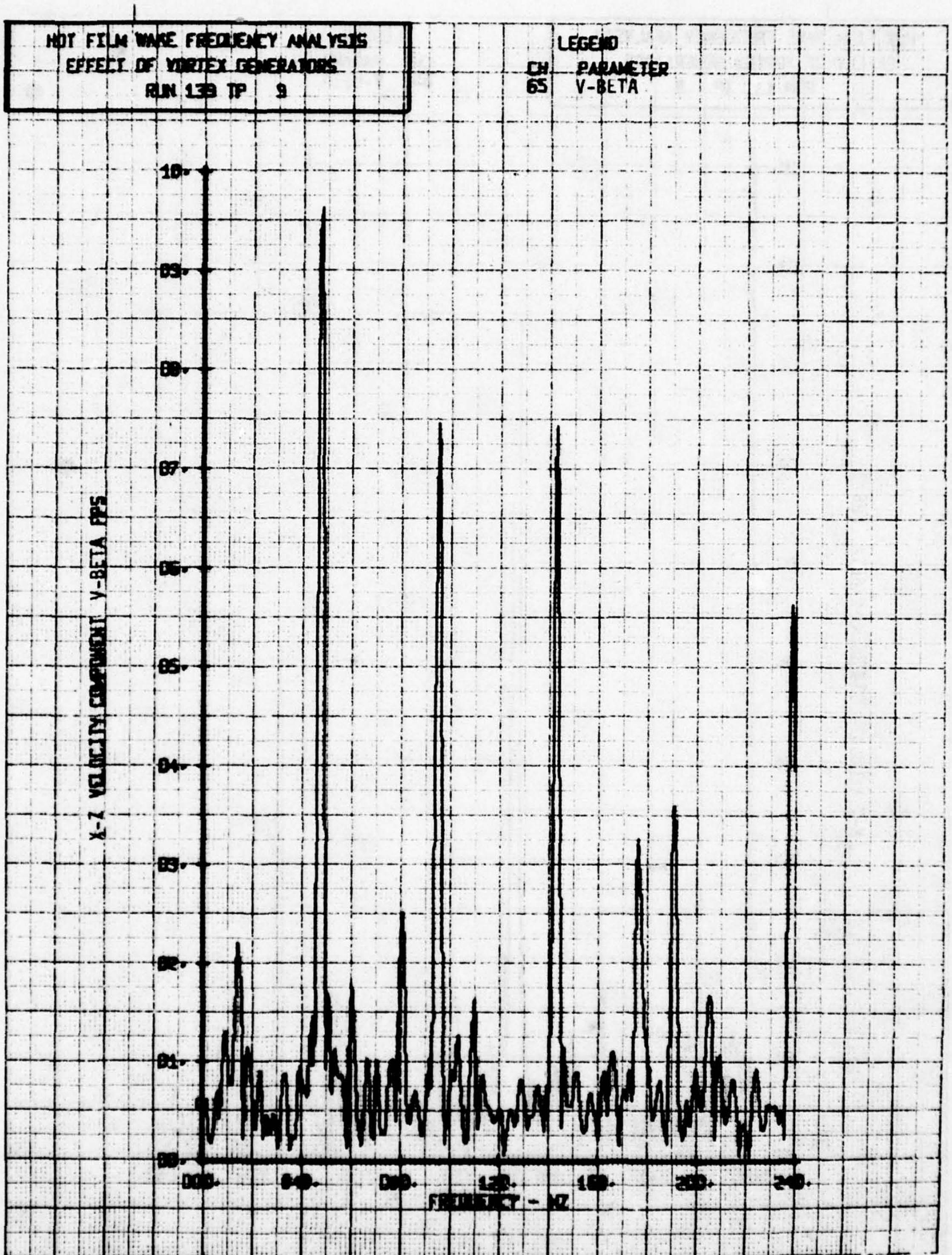
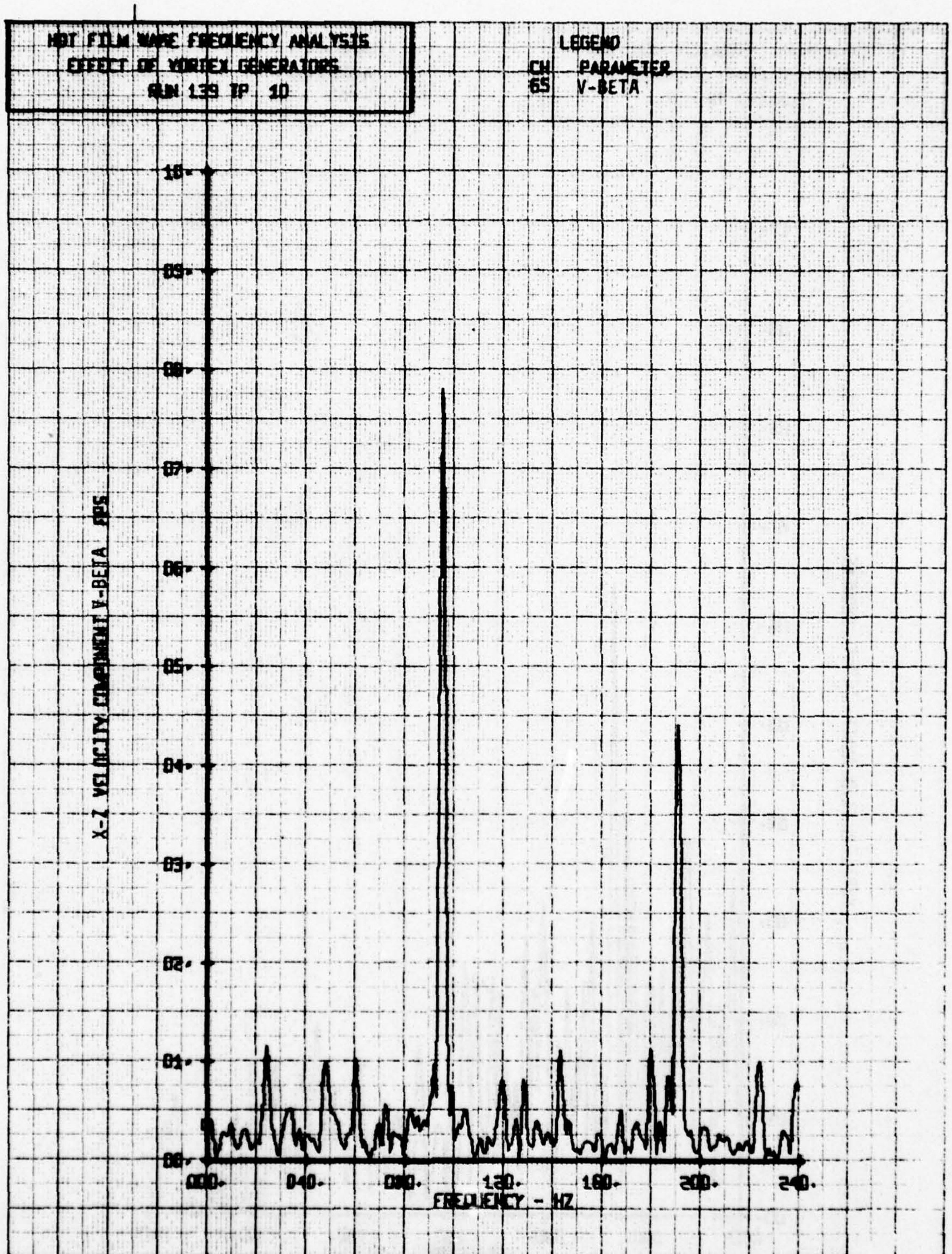
FREQUENCY - HZ


HOT FILM WAKE FREQUENCY ANALYSIS
EFFECT OF VORTEX GENERATORS
RUN 139 TP 8
LEGEND
CH PARAMETER
65 V-BETA
X-Z VELOCITY COMPONENT V-BETA, FPS
FREQUENCY - HZ


HOT FILM WAKE FREQUENCY ANALYSIS
EFFECT OF VORTEX GENERATORS
RUN 139 TP 9
LEGEND
CH PARAMETER
65 V-BETA
X-Z VELOCITY COMPONENT V-BETA FPS
FREQUENCY - HZ



HOT FILM WAKE FREQUENCY ANALYSIS
EFFECT OF VORTEX GENERATORS
RUN 139 TP 10
LEGEND
CH PARAMETER
65 V-BETA
X-Z VELOCITY COMPONENT V-BETA ABS
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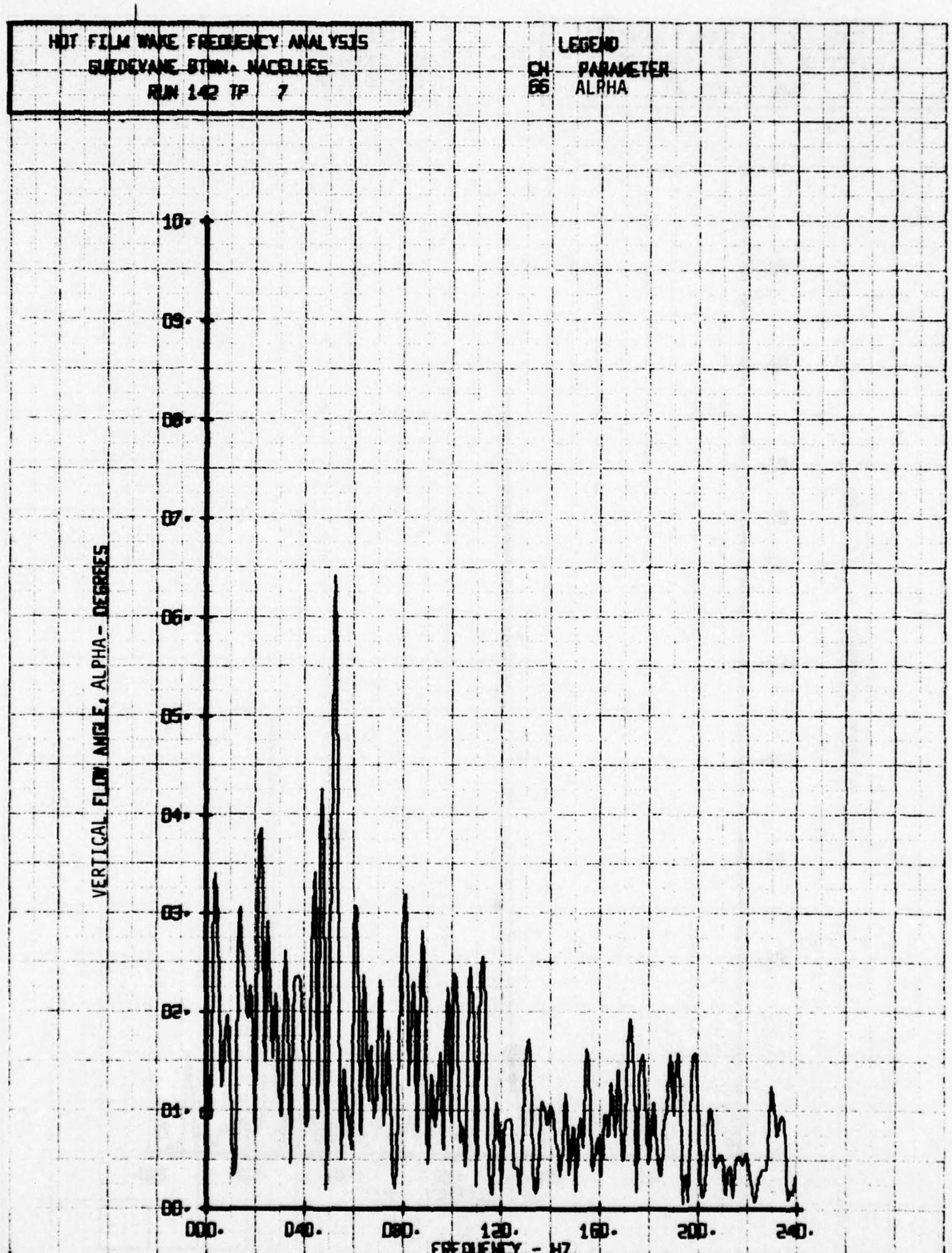
FREQUENCY - HZ


HOT FILM WAKE FREQUENCY ANALYSIS
GUIDEVANE BTWN. NACELLES
RUN 142 TP 7
LEGEND
CH PARAMETER
66 ALPHA
VERTICAL FLOW ANGLE, ALPHA- DEGREES
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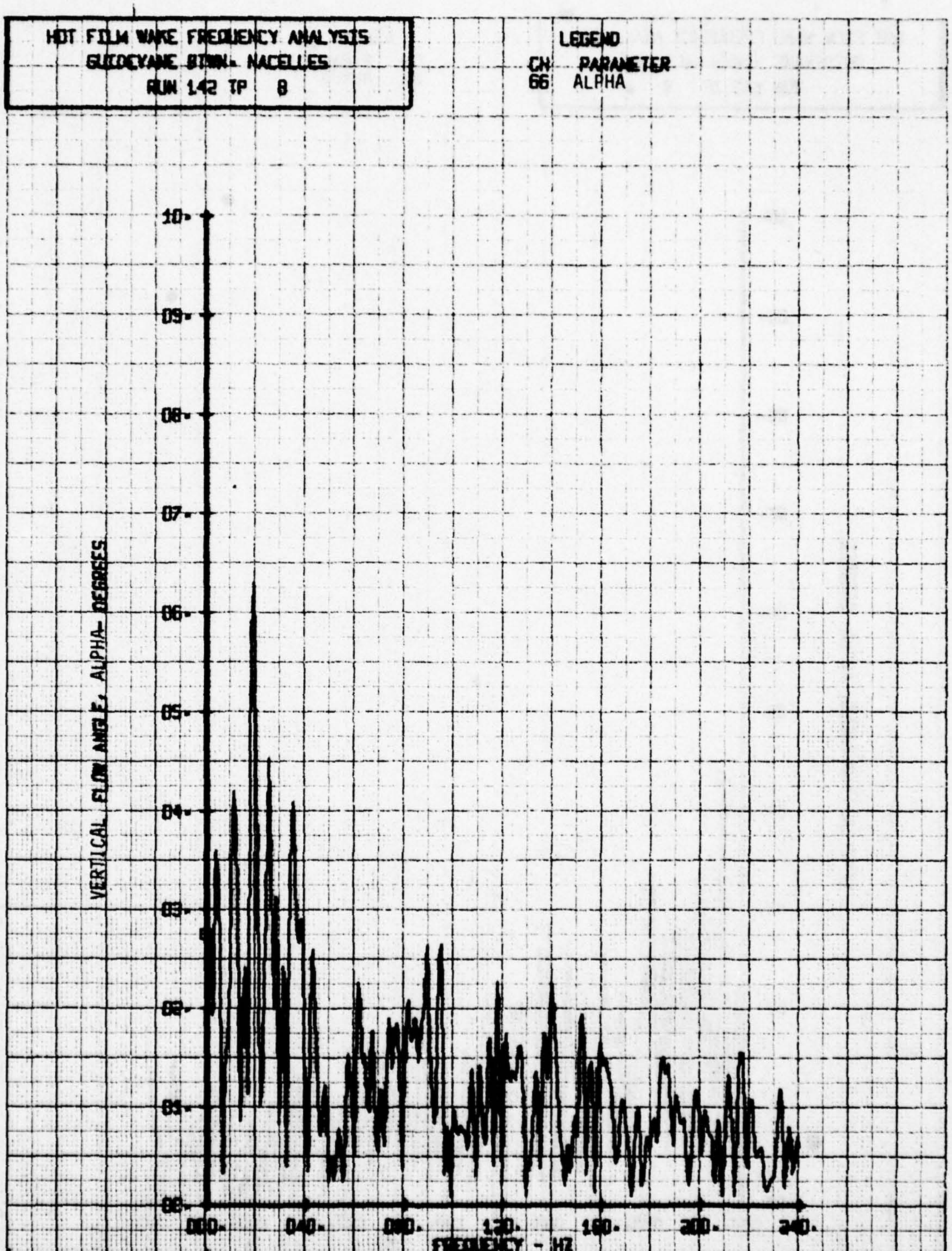
FREQUENCY - HZ


HOT FILM WAKE FREQUENCY ANALYSIS
GUIDEVANE BTWN. NACELLES
RUN 142 TP 8
LEGEND
CH PARAMETER
66 ALPHA
VERTICAL FLOW ANGLE, ALPHA- DEGREES
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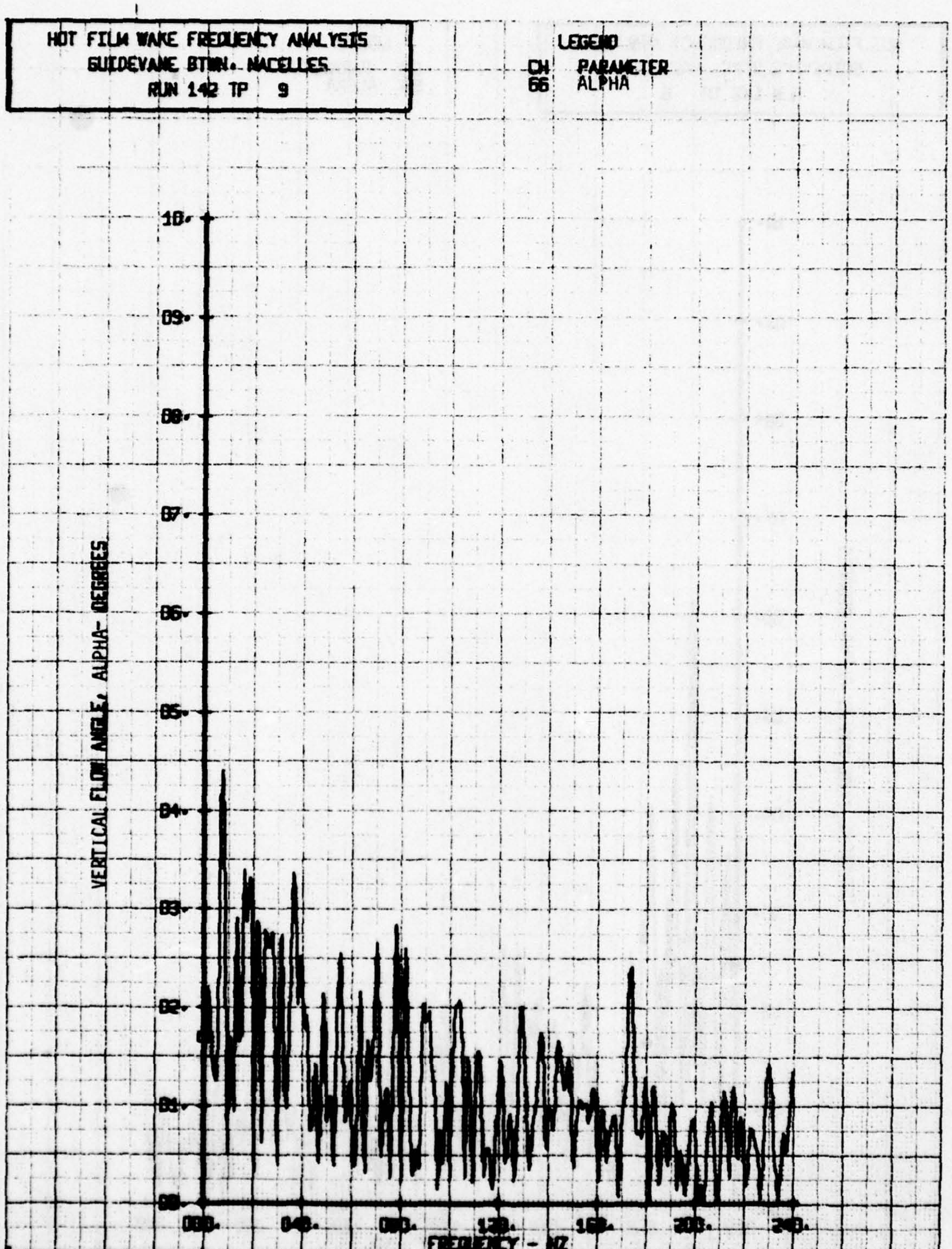
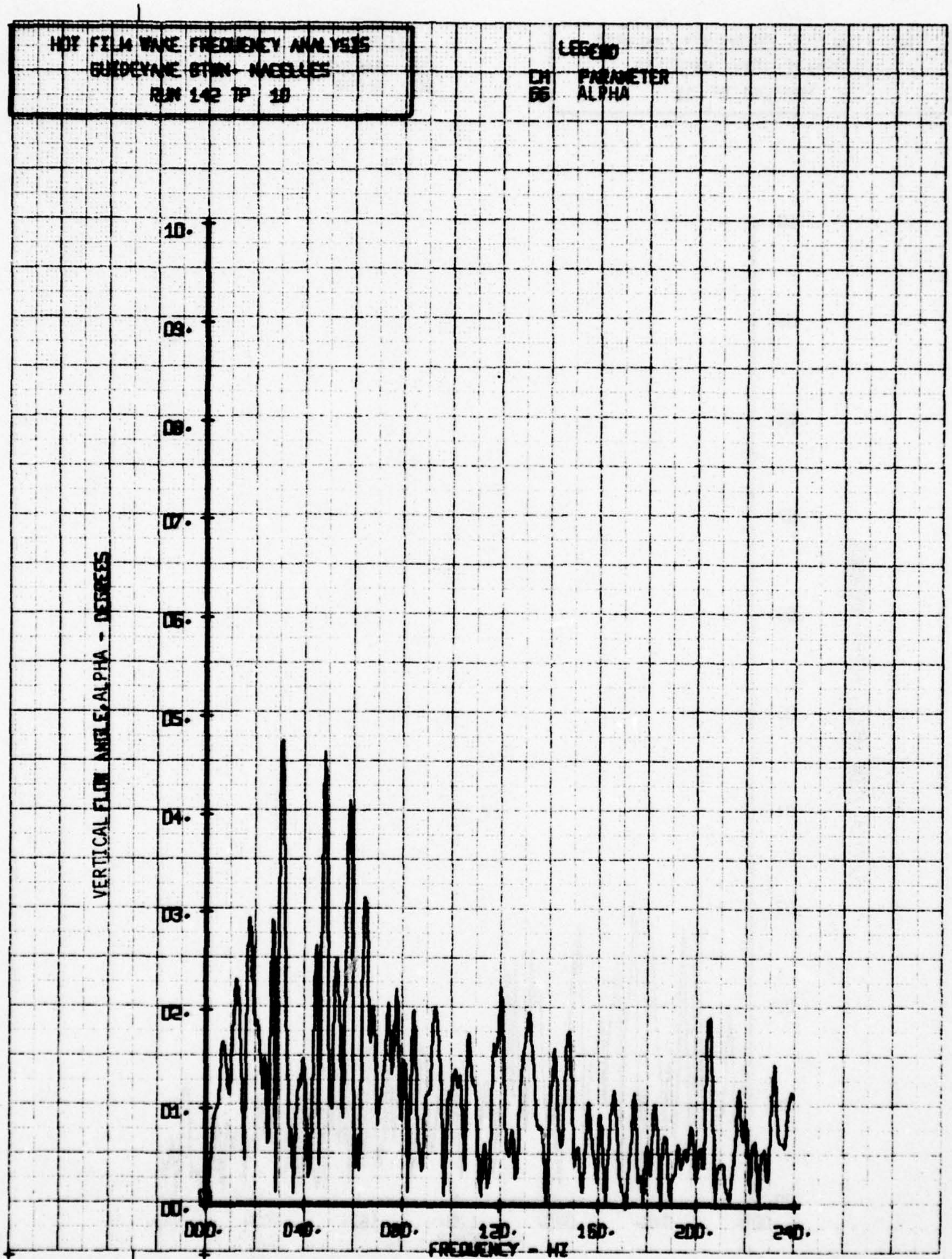
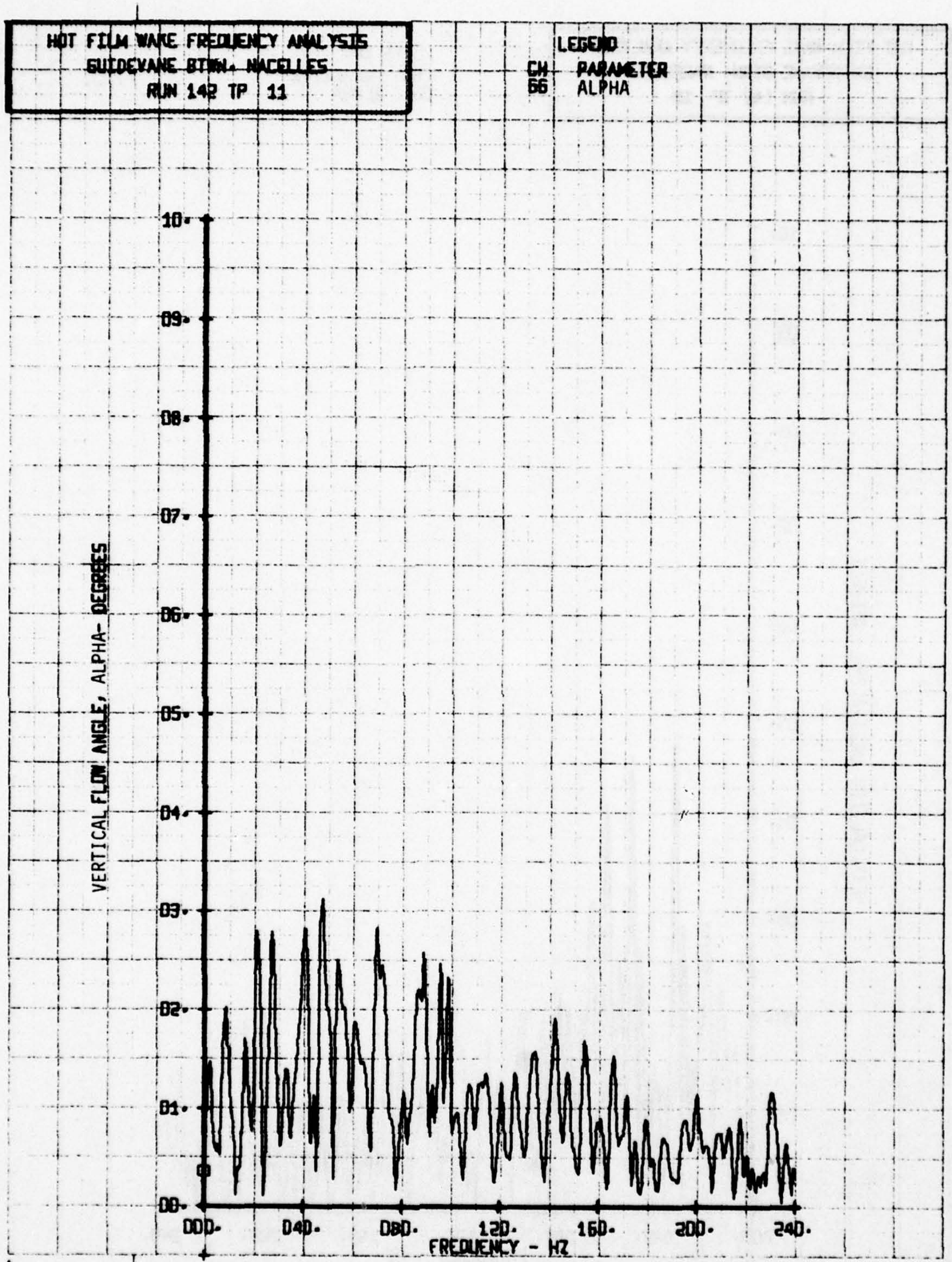
FREQUENCY - HZ


HOT FILM WAKE FREQUENCY ANALYSIS
GUIDEVANE BTWN. NACELLES
RUN 142 TP 9
LEGEND
CH PARAMETER
66 ALPHA
VERTICAL FLOW ANGLE, ALPHA- DEGREES
FREQUENCY - HZ



HOT FILM WAKE FREQUENCY ANALYSIS
GUIDEVANE BTWN- NACELLES
RUN 142 TP 10
LEGEND
CH PARAMETER
66 ALPHA
VERTICAL FLOW ANGLE,ALPHA - DEGREES
FREQUENCY - HZ


HOT FILM WAKE FREQUENCY ANALYSIS
GUIDEVANE BTWN. NACELLES
RUN 142 TP 11
LEGEND
CH PARAMETER
66 ALPHA
VERTICAL FLOW ANGLE, ALPHA- DEGREES
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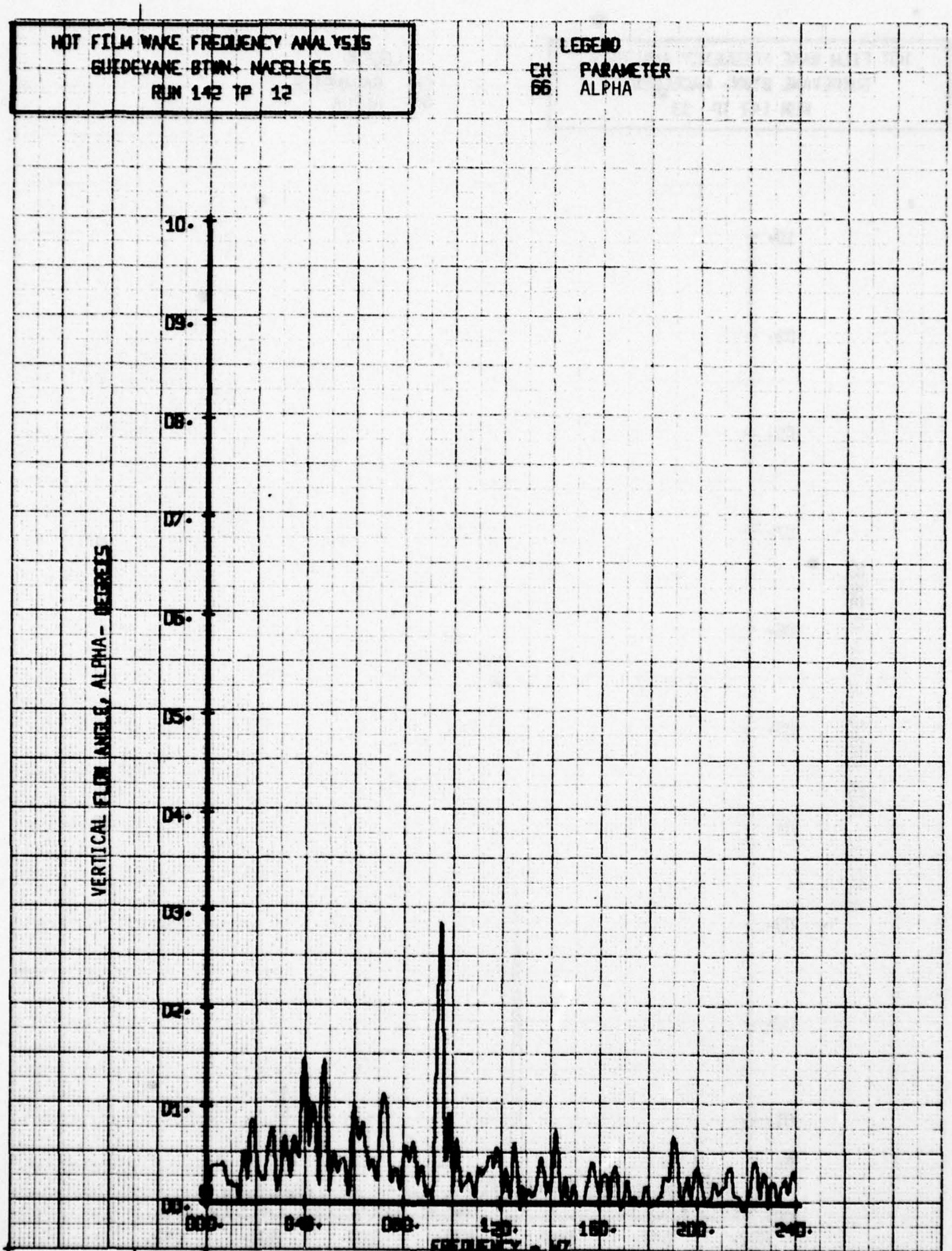
FREQUENCY - HZ


HOT FILM WAKE FREQUENCY ANALYSIS
GUIDEVANE BTWN. NACELLES
RUN 142 TP 12
LEGEND
CH PARAMETER
66 ALPHA
VERTICAL FLOW ANGLE, ALPHA - DEGREES
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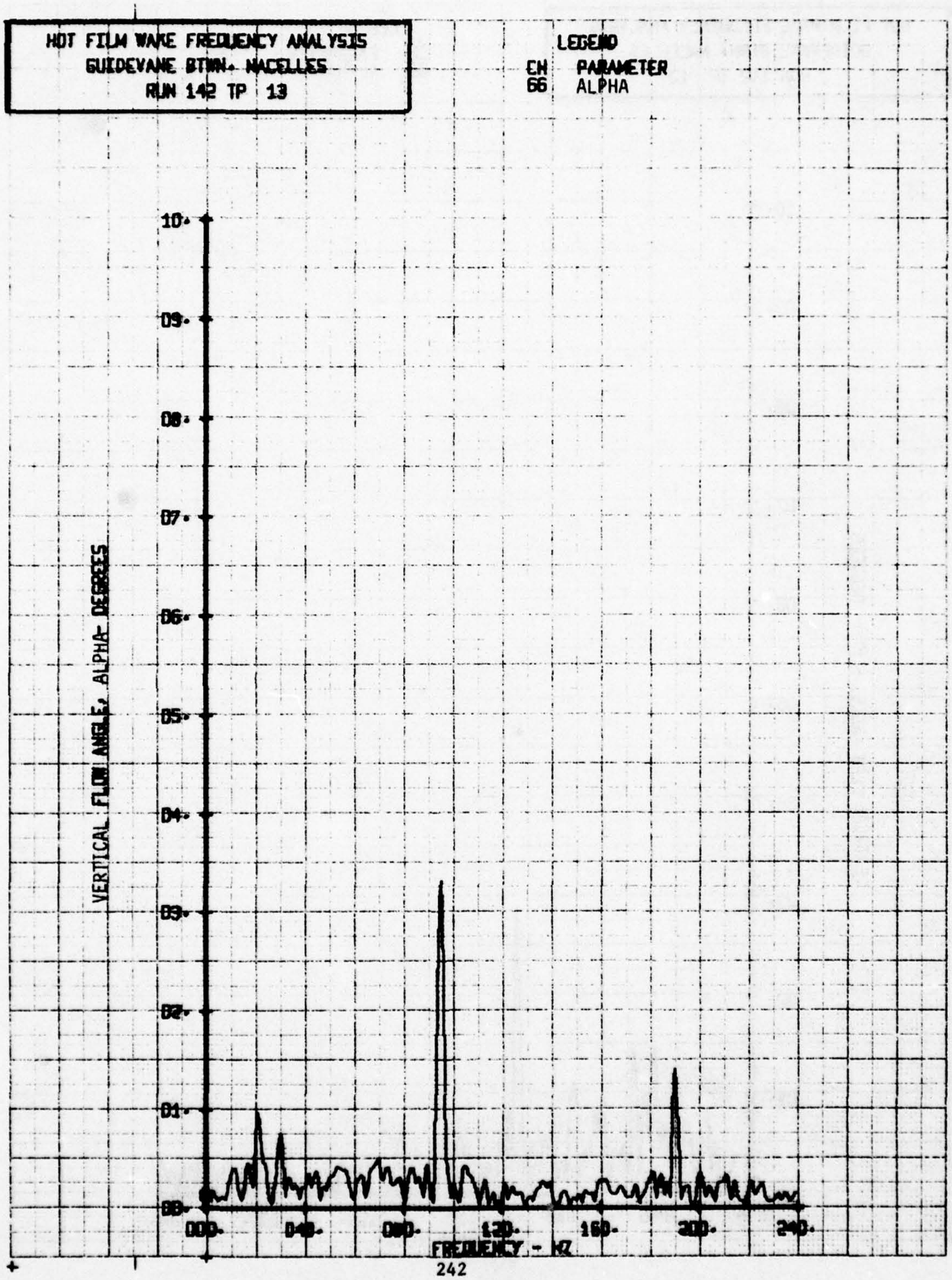
FREQUENCY - HZ


HOT FILM WAKE FREQUENCY ANALYSIS
GUIDEVANE BTWN. NACELLES
RUN 142 TP 13
LEGEND
CH PARAMETER
66 ALPHA
VERTICAL FLOW ANGLE, ALPHA- DEGREES
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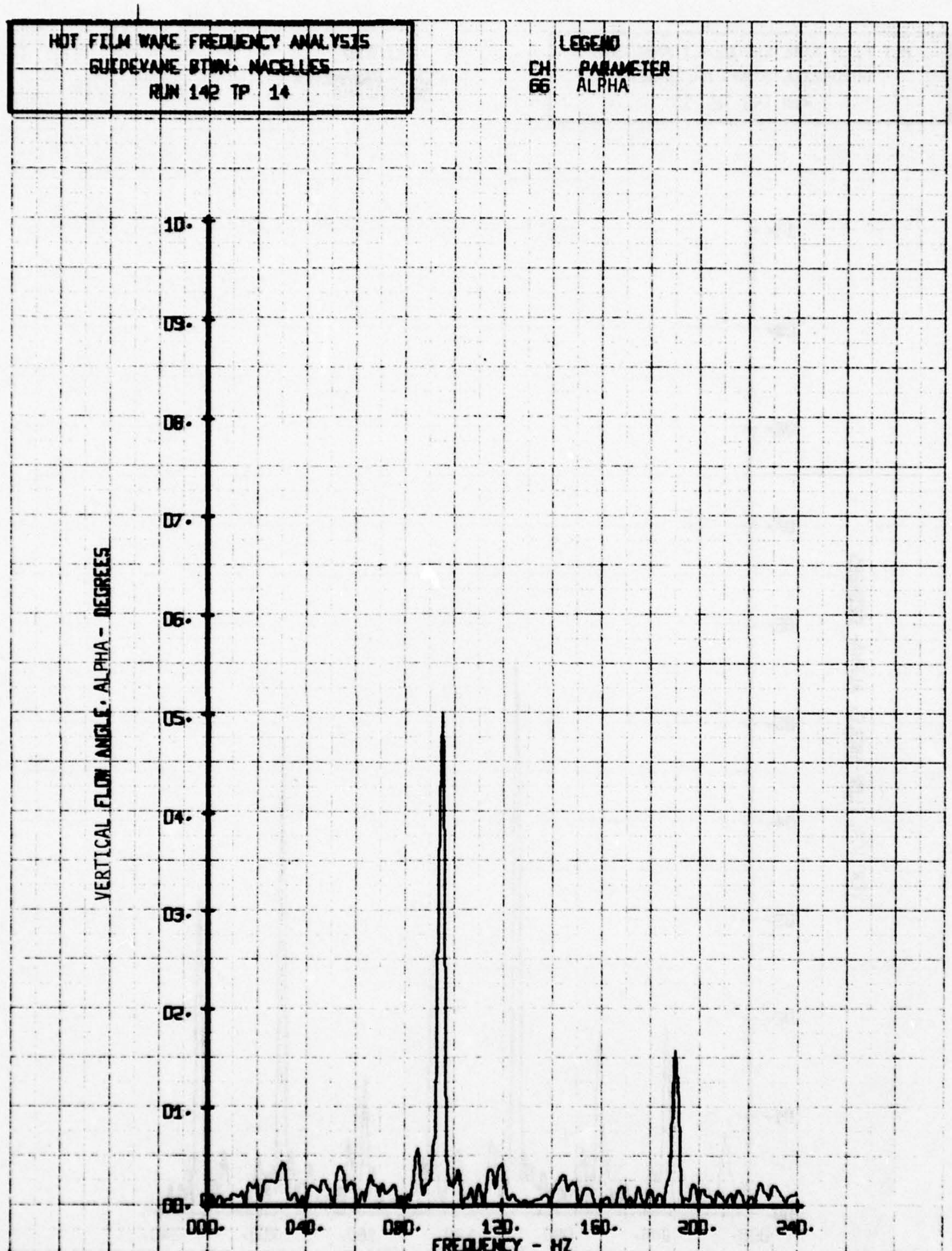
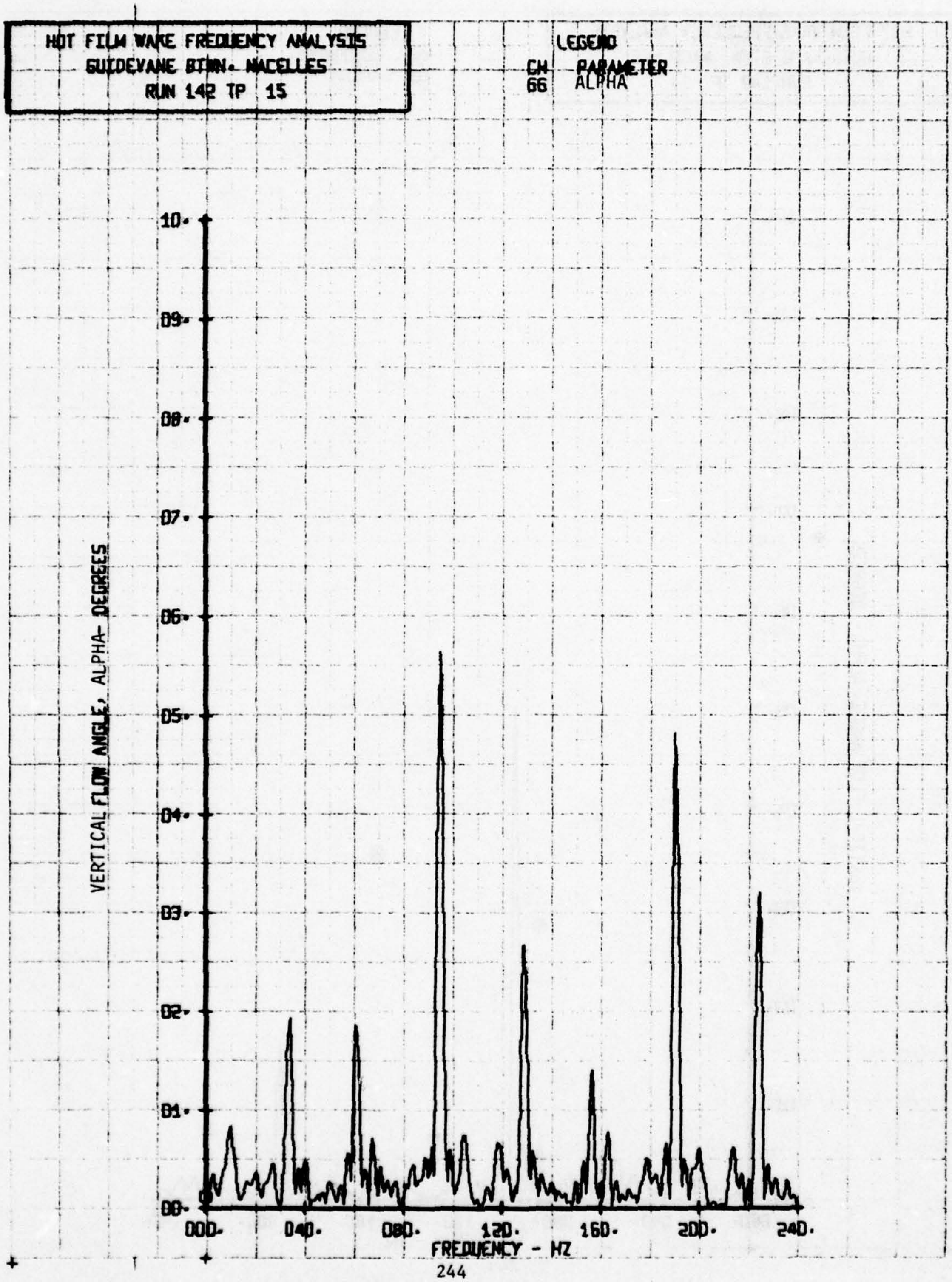
FREQUENCY - HZ


HOT FILM WAKE FREQUENCY ANALYSIS
GUIDEVANE BTWN. NACELLES
RUN 142 TP 14
LEGEND
CH PARAMETER
66 ALPHA
VERTICAL FLOW ANGLE, ALPHA - DEGREES
FREQUENCY - HZ


HOT FILM WAKE FREQUENCY ANALYSIS
GUIDEVANE BTWN. NACELLES
RUN 142 TP 15
LEGEND
CH PARAMETER
66 ALPHA
VERTICAL FLOW ANGLE, ALPHA- DEGREES
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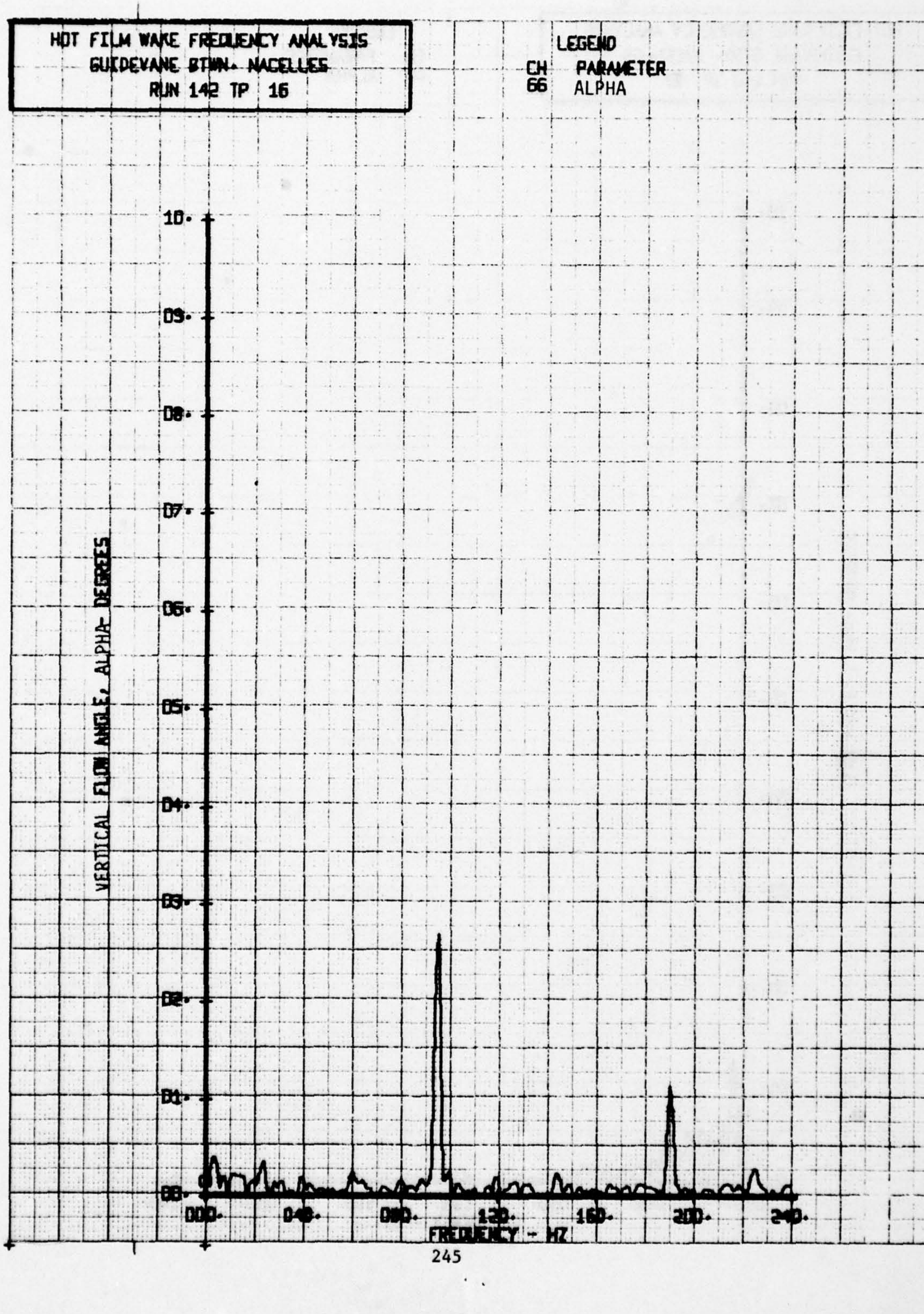
FREQUENCY - HZ


HOT FILM WAKE FREQUENCY ANALYSIS
GUIDEVANE BTWN. NACELLES
RUN 142 TP 16
LEGEND
CH PARAMETER
66 ALPHA
VERTICAL FLOW ANGLE, ALPHA- DEGREES
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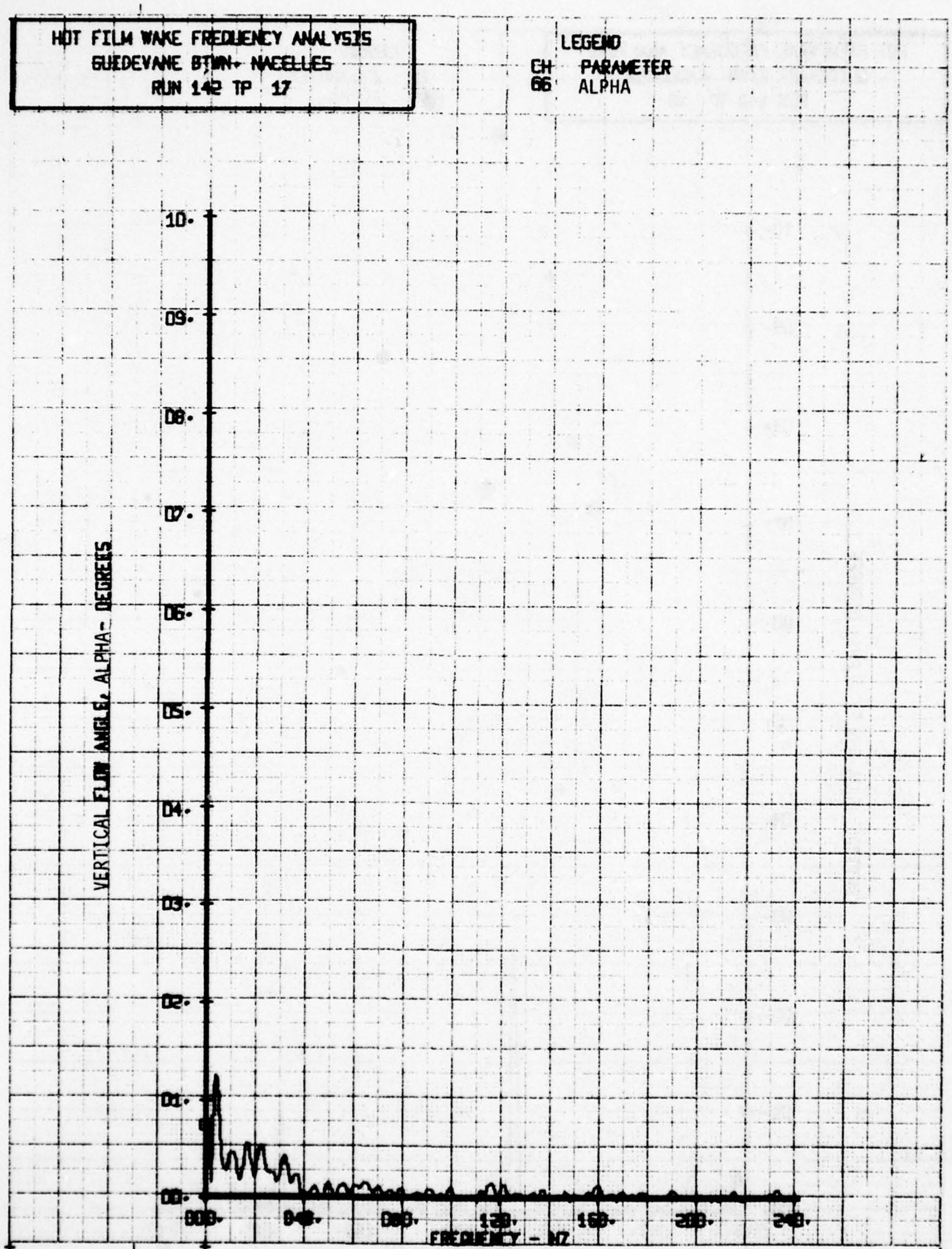
FREQUENCY - HZ


HOT FILM WAKE FREQUENCY ANALYSIS
GUIDEVANE BTWN. NACELLES
RUN 142 TP 17
LEGEND
CH PARAMETER
66 ALPHA
VERTICAL FLOW ANGLE, ALPHA- DEGREES
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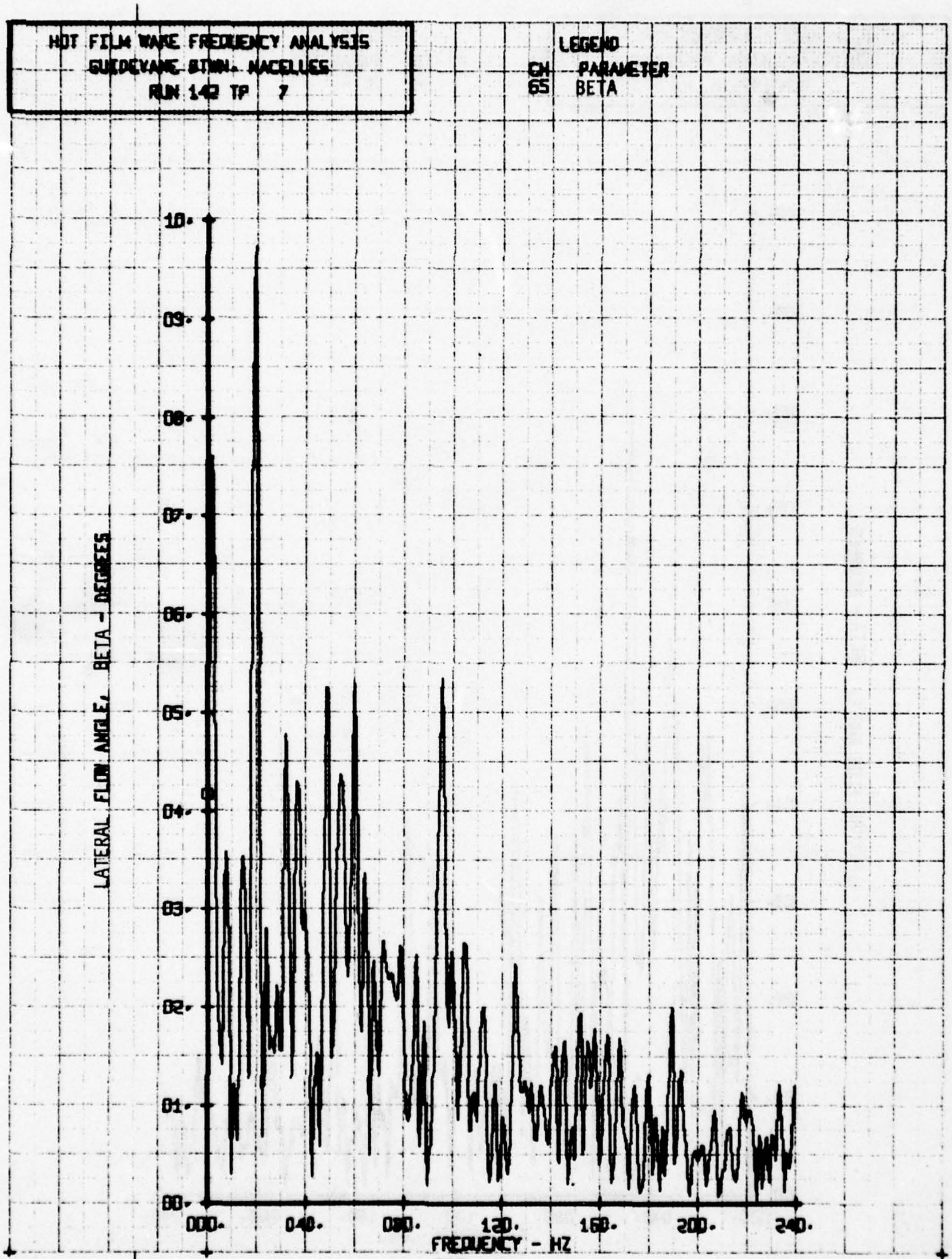
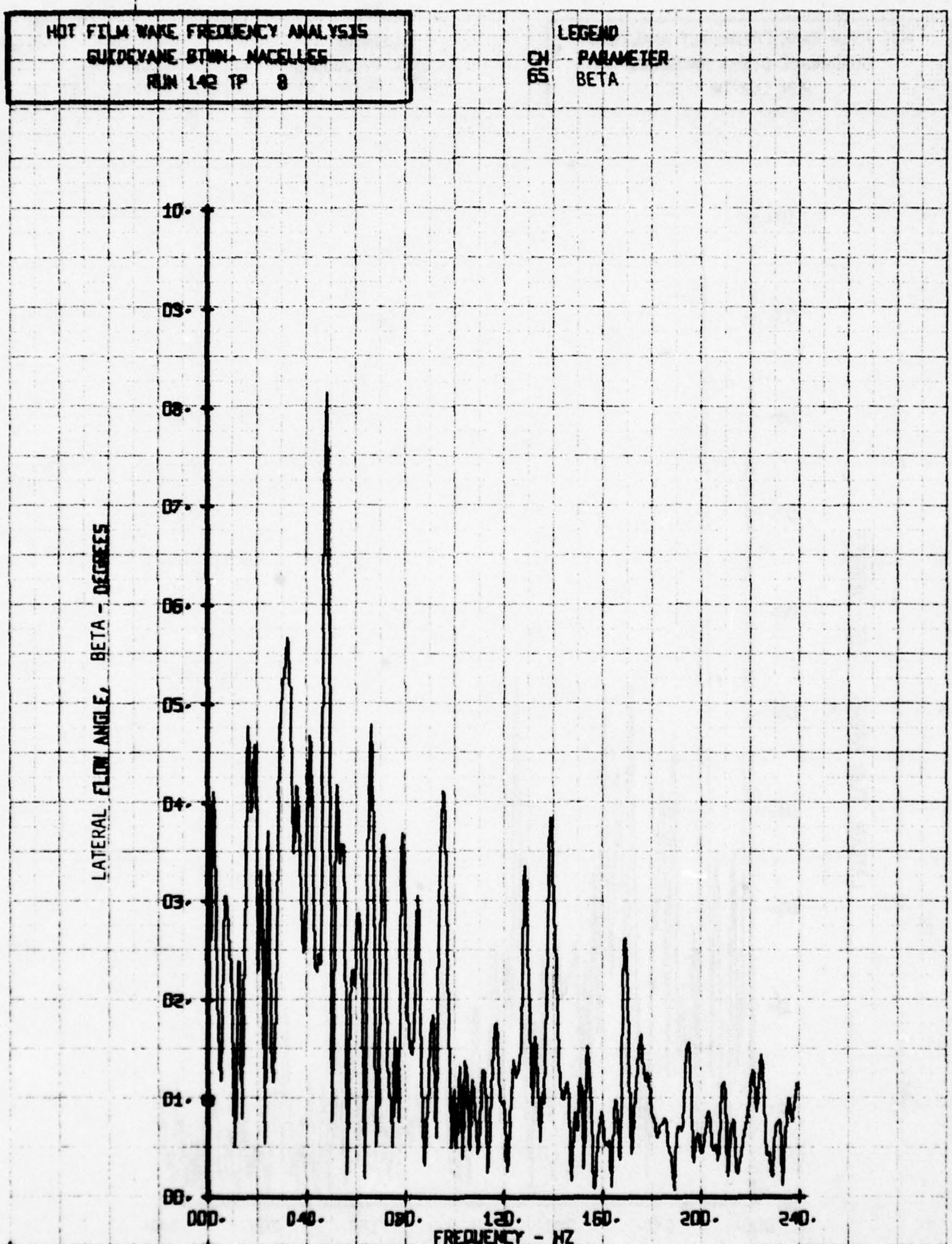
FREQUENCY - HZ



HOT FILM WAKE FREQUENCY ANALYSIS
GUIDEVANE STWN. NACELLES
RUN 142 TP 7
LEGEND
CH PARAMETER
65 BETA
LATERAL FLOW ANGLE, BETA - DEGREES
FREQUENCY - HZ


HOT FILM WAKE FREQUENCY ANALYSIS
GUIDEVANE BTWN. NACELLES
RUN 142 TP 8
LEGEND
CH PARAMETER
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LATERAL FLOW ANGLE, BETA - DEGREES
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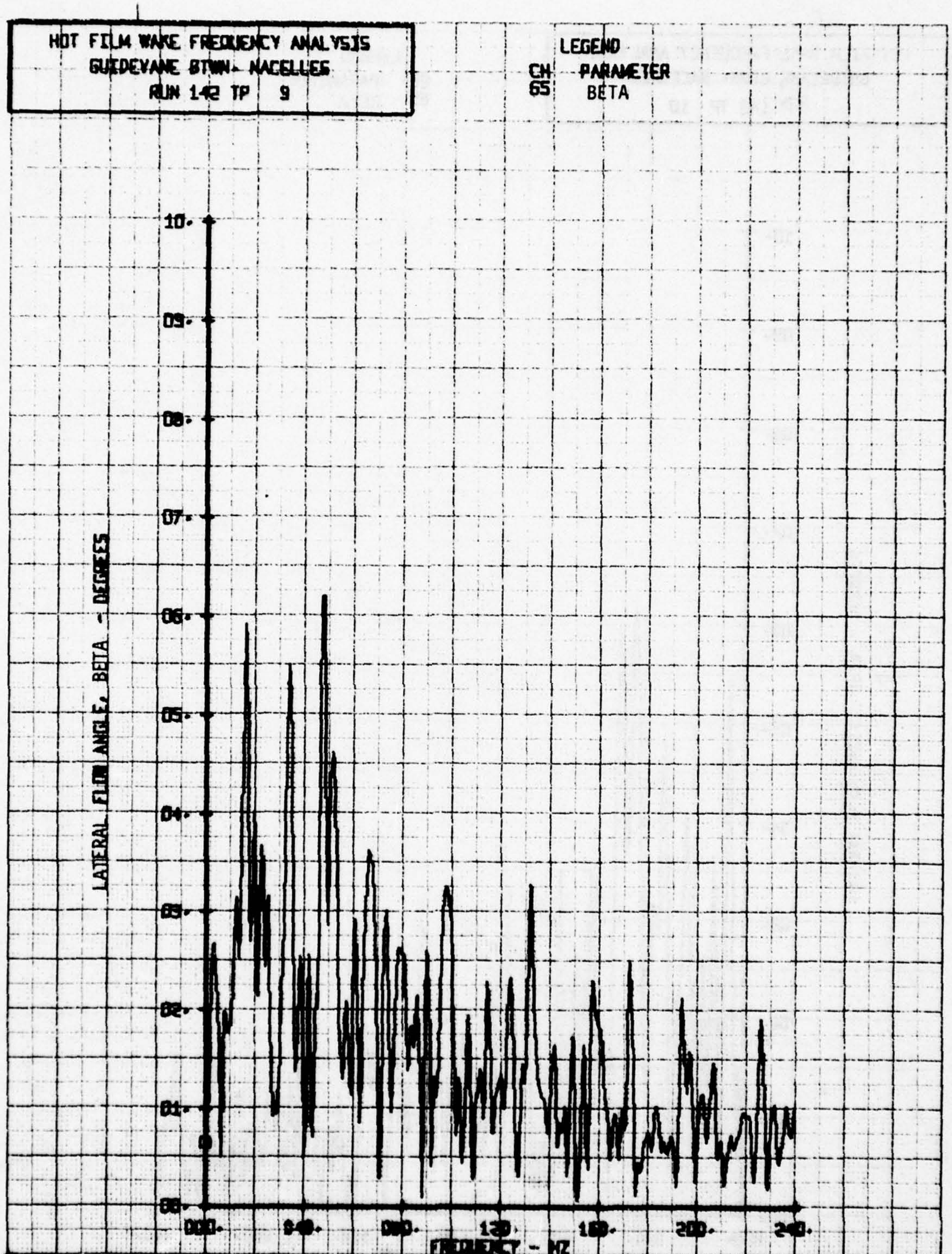
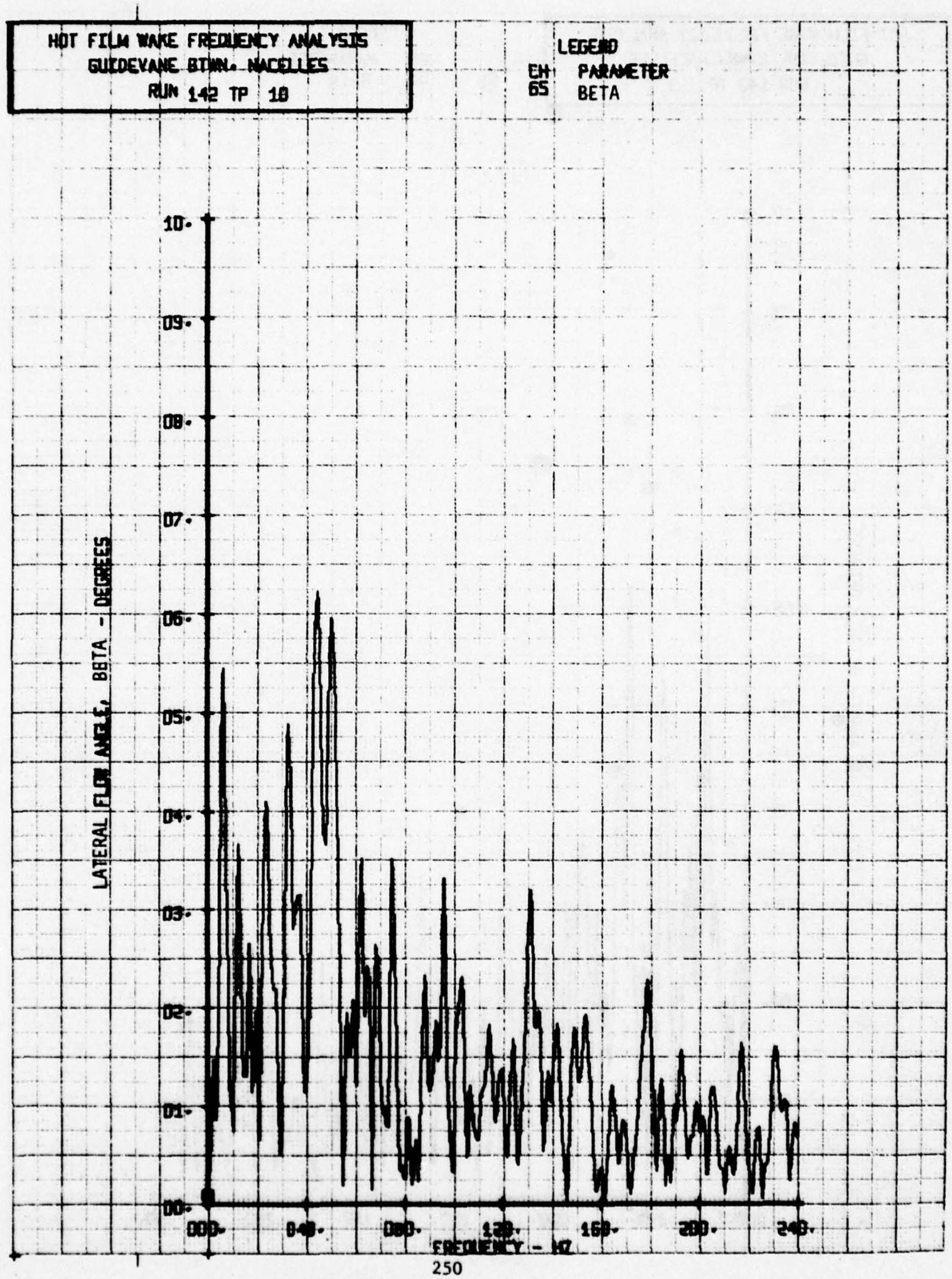

HOT FILM WAKE FREQUENCY ANALYSIS
GUIDEVANE BTWN. NACELLES
RUN 142 TP 9
LEGEND
CH PARAMETER
65 BETA
LATERAL FLOW ANGLE, BETA - DEGREES
FREQUENCY - HZ


HOT FILM WAKE FREQUENCY ANALYSIS
GUIDEVANE BTWN. NACELLES
RUN 142 TP 10
LEGEND
CH PARAMETER
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LATERAL FLOW ANGLE, BETA - DEGREES
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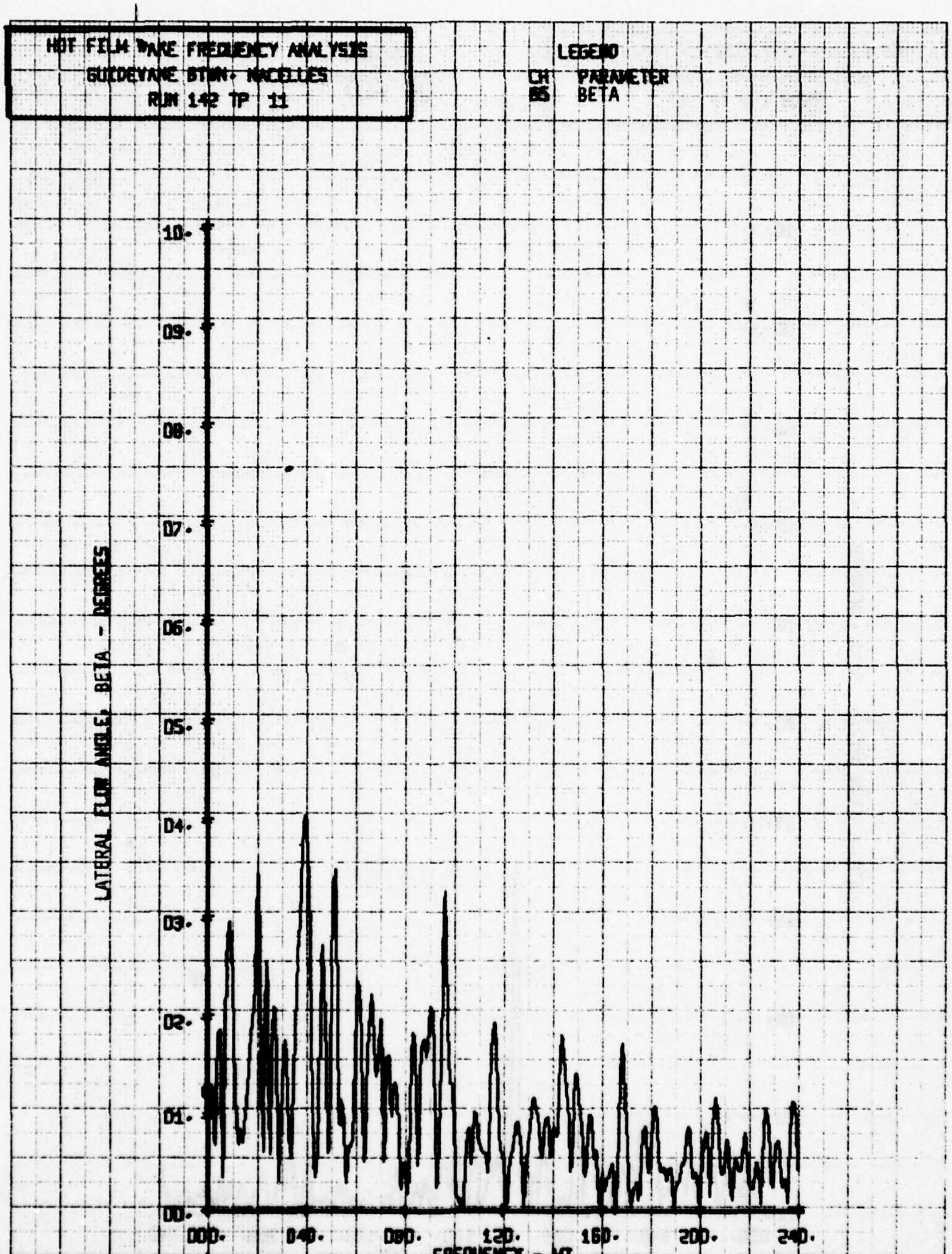
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GUIDEVANE BTWN. NACELLES
RUN 142 TP 11
LEGEND
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LATERAL FLOW ANGLE, BETA - DEGREES
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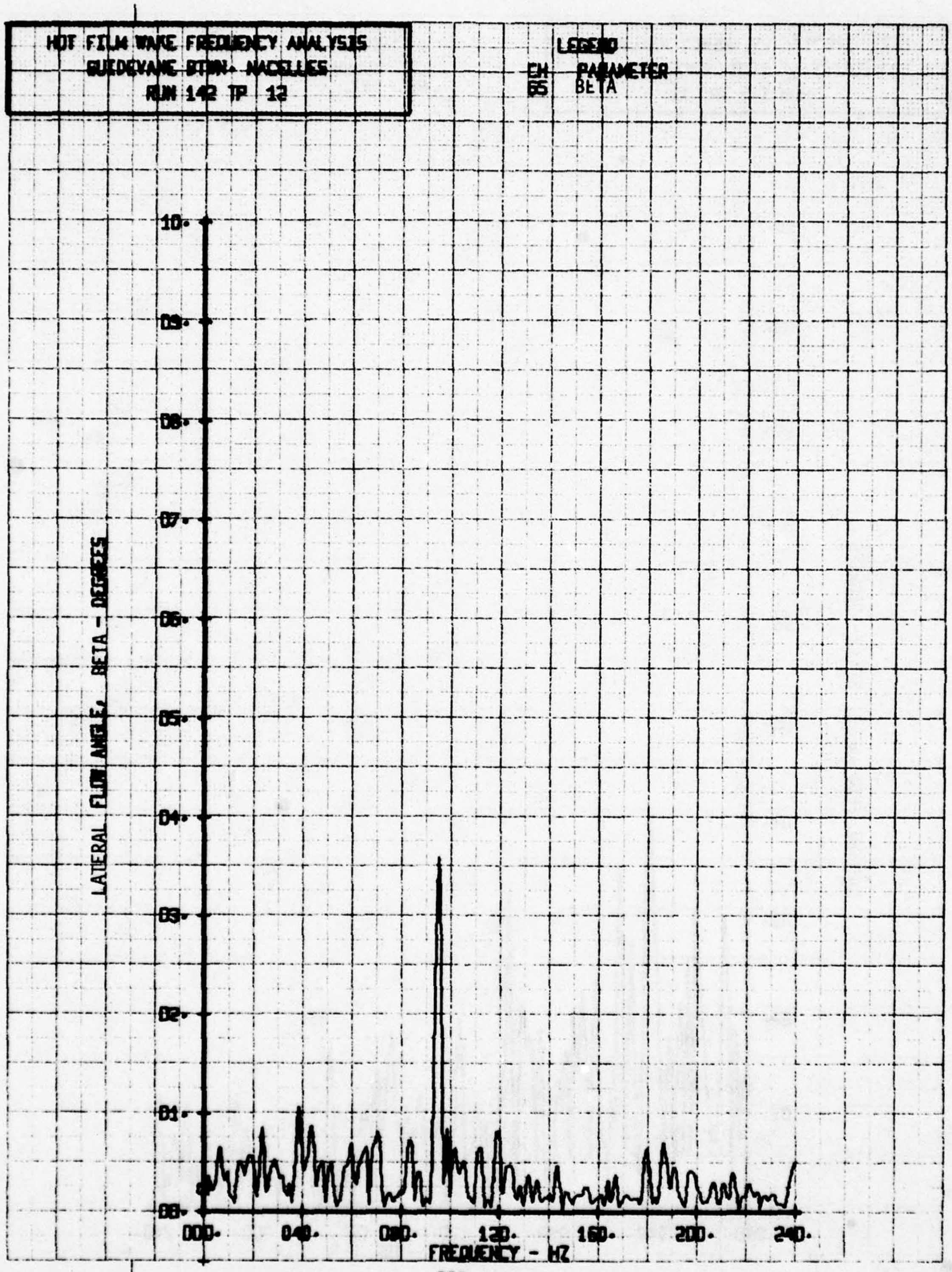
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GUIDEVANE BTWN. NACELLES
RUN 142 TP 12
LEGEND
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LATERAL FLOW ANGLE, BETA - DEGREES
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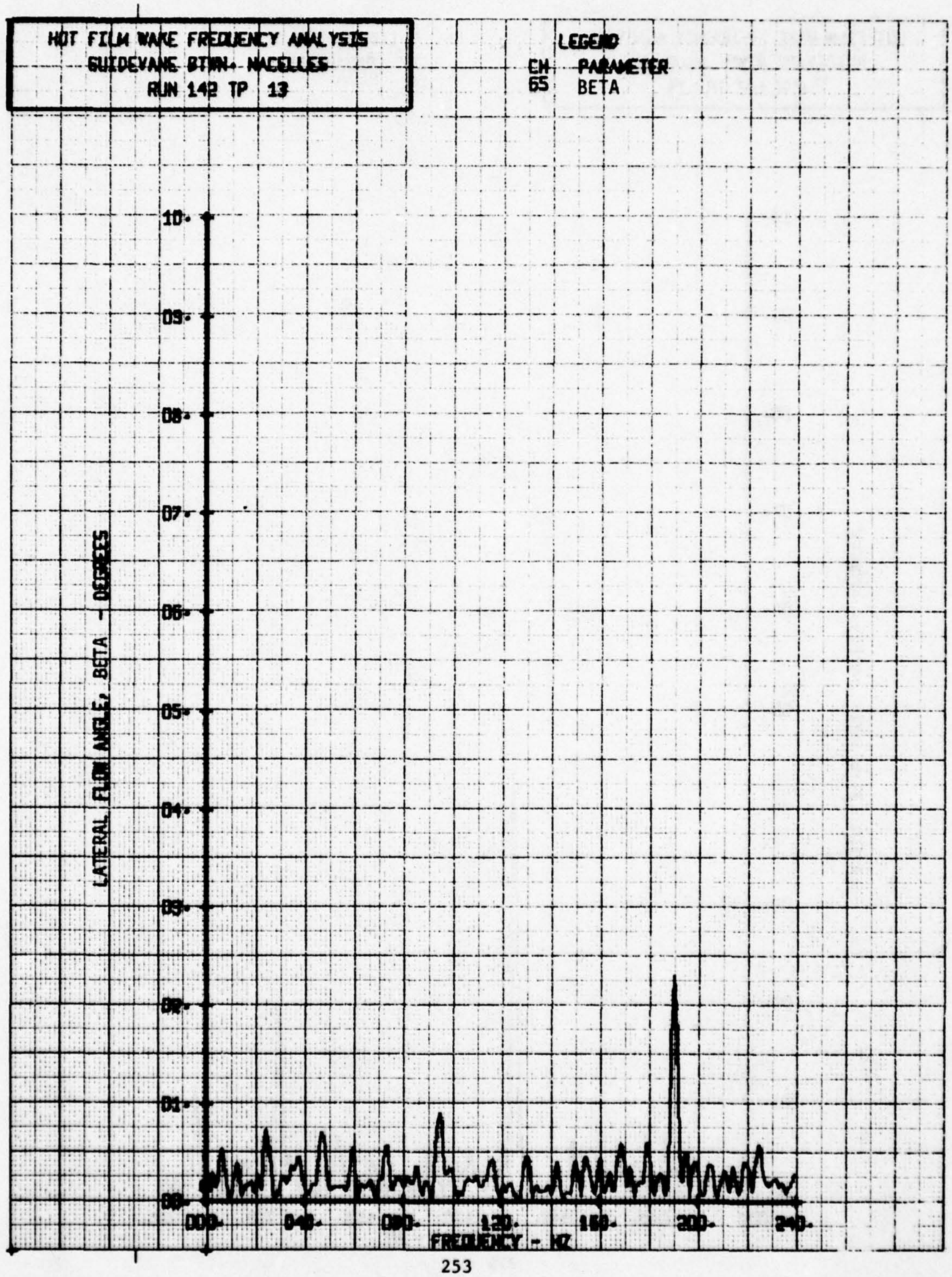
FREQUENCY - HZ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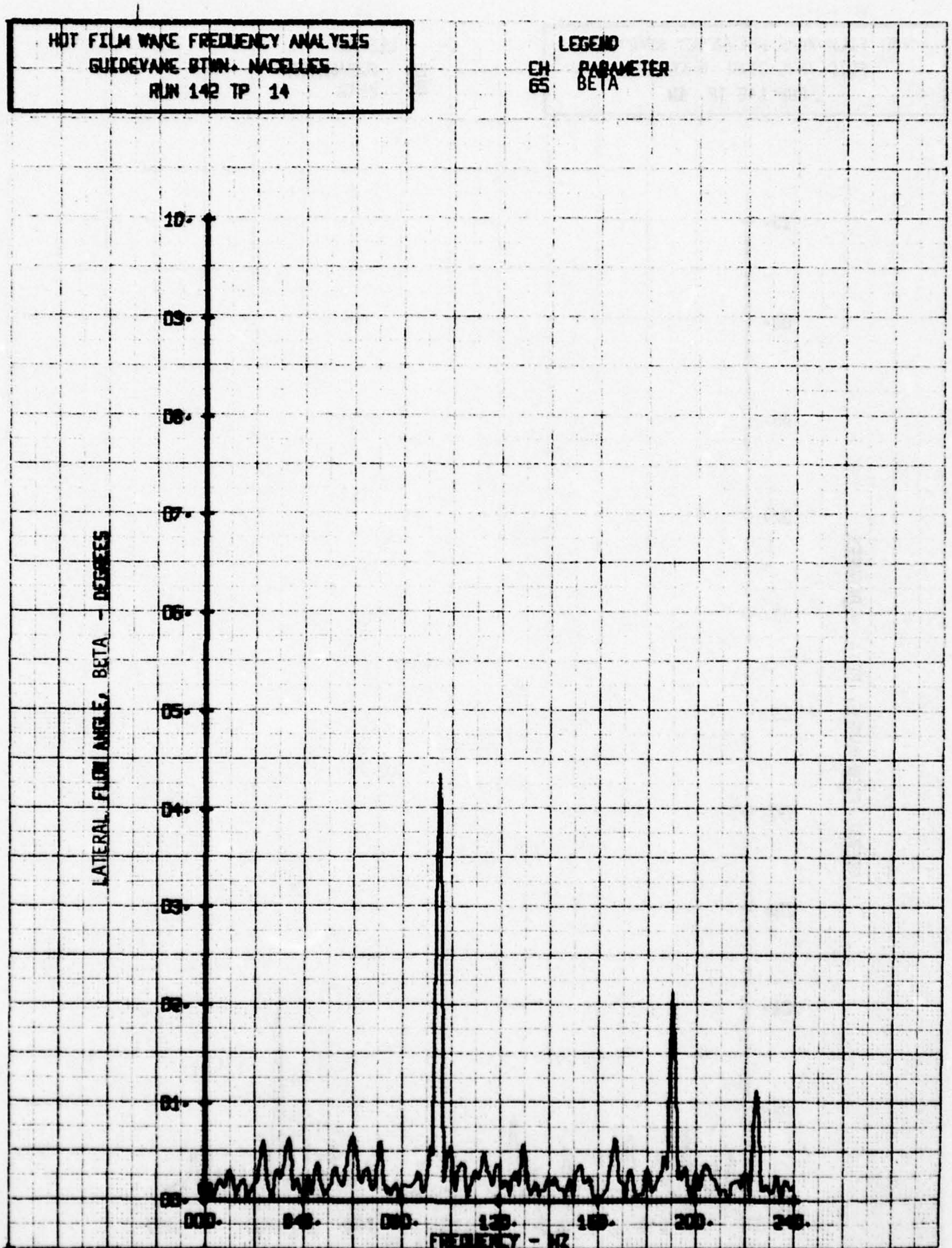
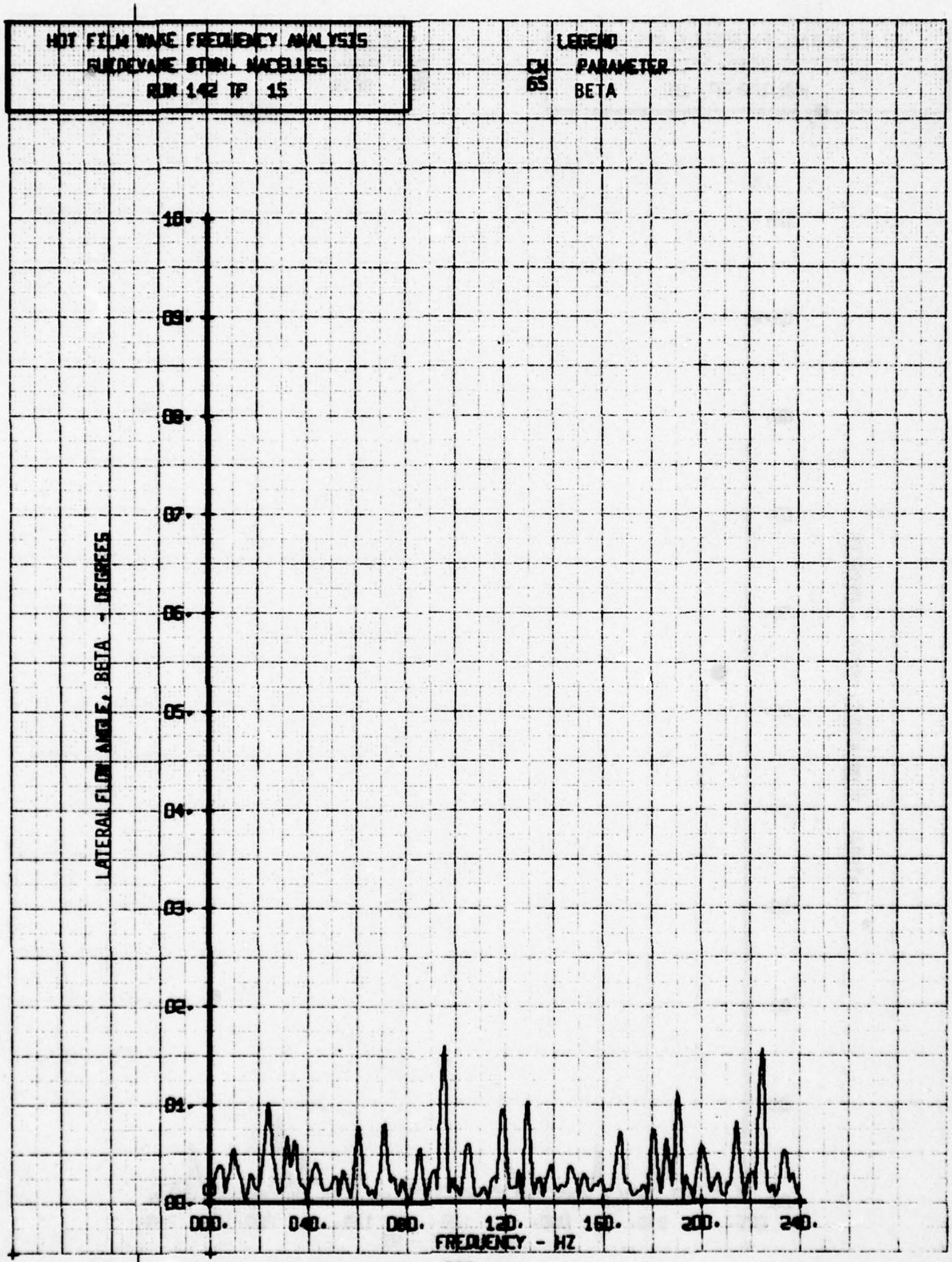
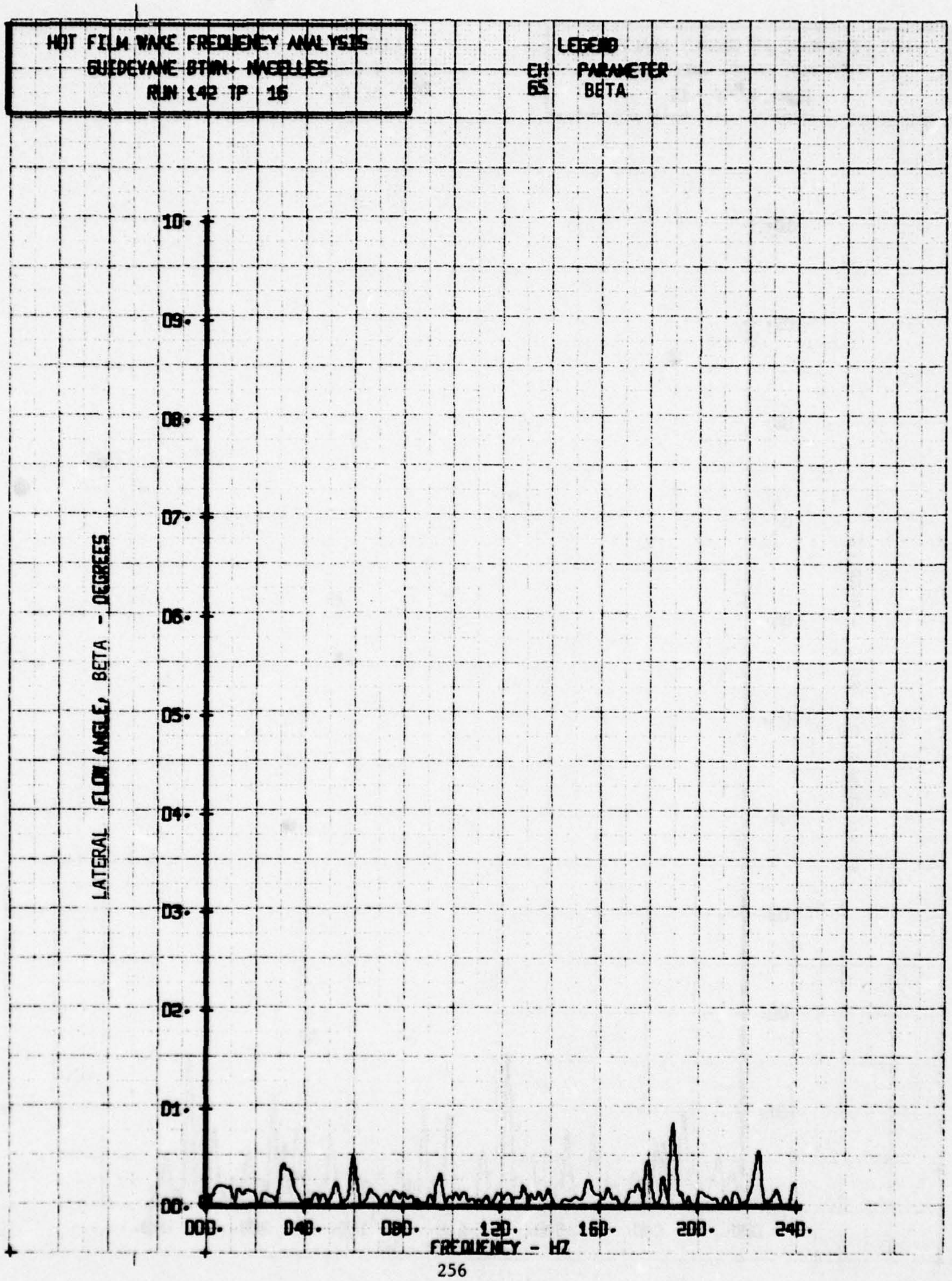
GUIDEVANE BTWN. NACELLES
RUN 142 TP 13
LEGEND
CH PARAMETER
65 BETA
LATERAL FLOW ANGLE, BETA - DEGREES
FREQUENCY - HZ


HOT FILM WAKE FREQUENCY ANALYSIS
GUIDEVANE BTWN. NACELLES
RUN 142 TP 14
LEGEND
CH PARAMETER
65 BETA
LATERAL FLOW ANGLE, BETA - DEGREES
FREQUENCY - HZ


HOT FILM WAKE FREQUENCY ANALYSIS
RUN 142 TP 15
LEGEND
CH PARAMETER
65 BETA
LATERAL FLOW ANGLE, BETA - DEGREES
FREQUENCY - HZ


HOT FILM WAKE FREQUENCY ANALYSIS
GUIDEVANE BTWN. NACELLES
RUN 142 TP 16
LEGEND
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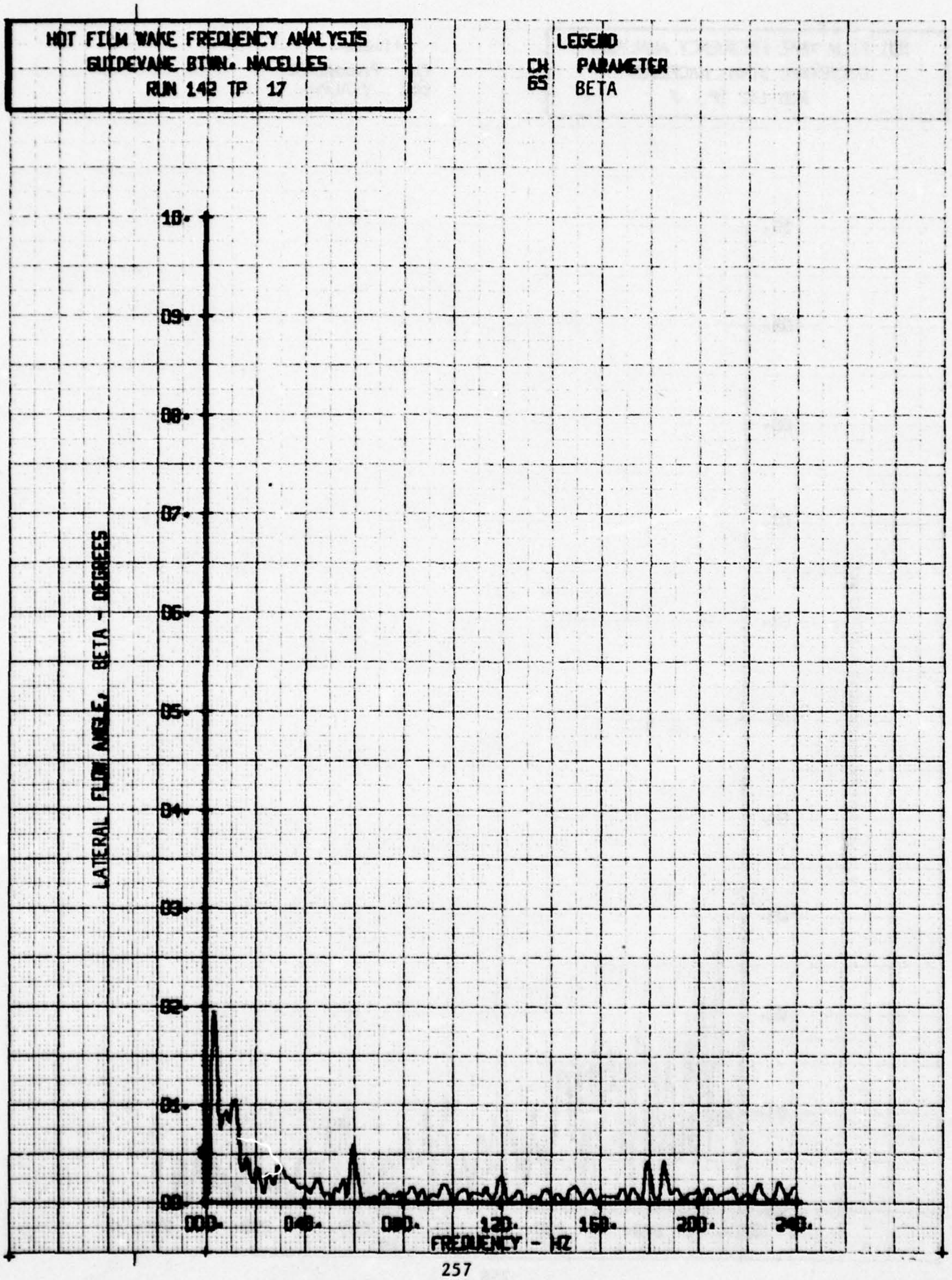
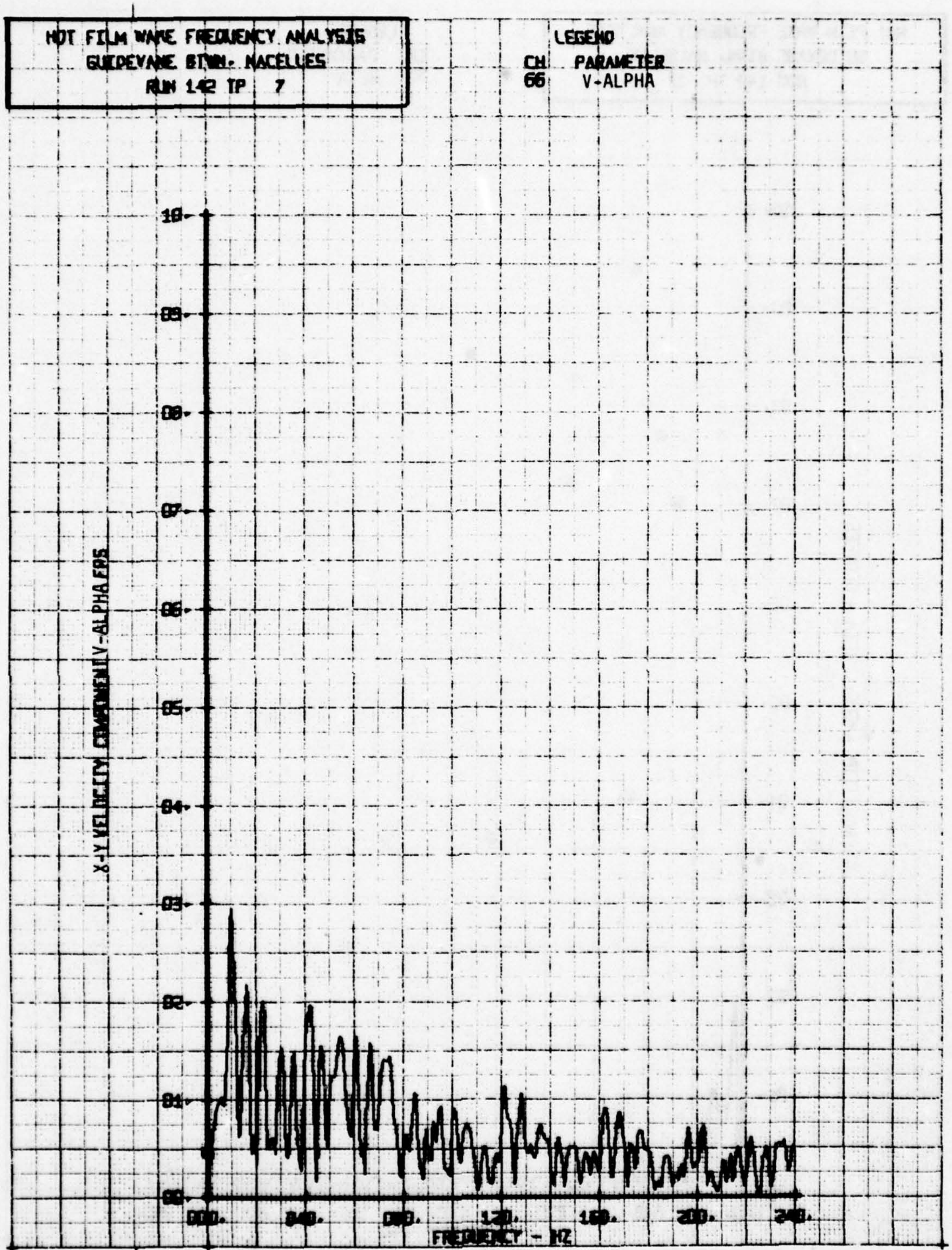
FREQUENCY - HZ


HOT FILM WAKE FREQUENCY ANALYSIS
GUIDEVANE BTWN. NACELLES
RUN 142 TP 17
LEGEND
CH PARAMETER
65 BETA
LATERAL FLOW ANGLE, BETA - DEGREES
FREQUENCY - HZ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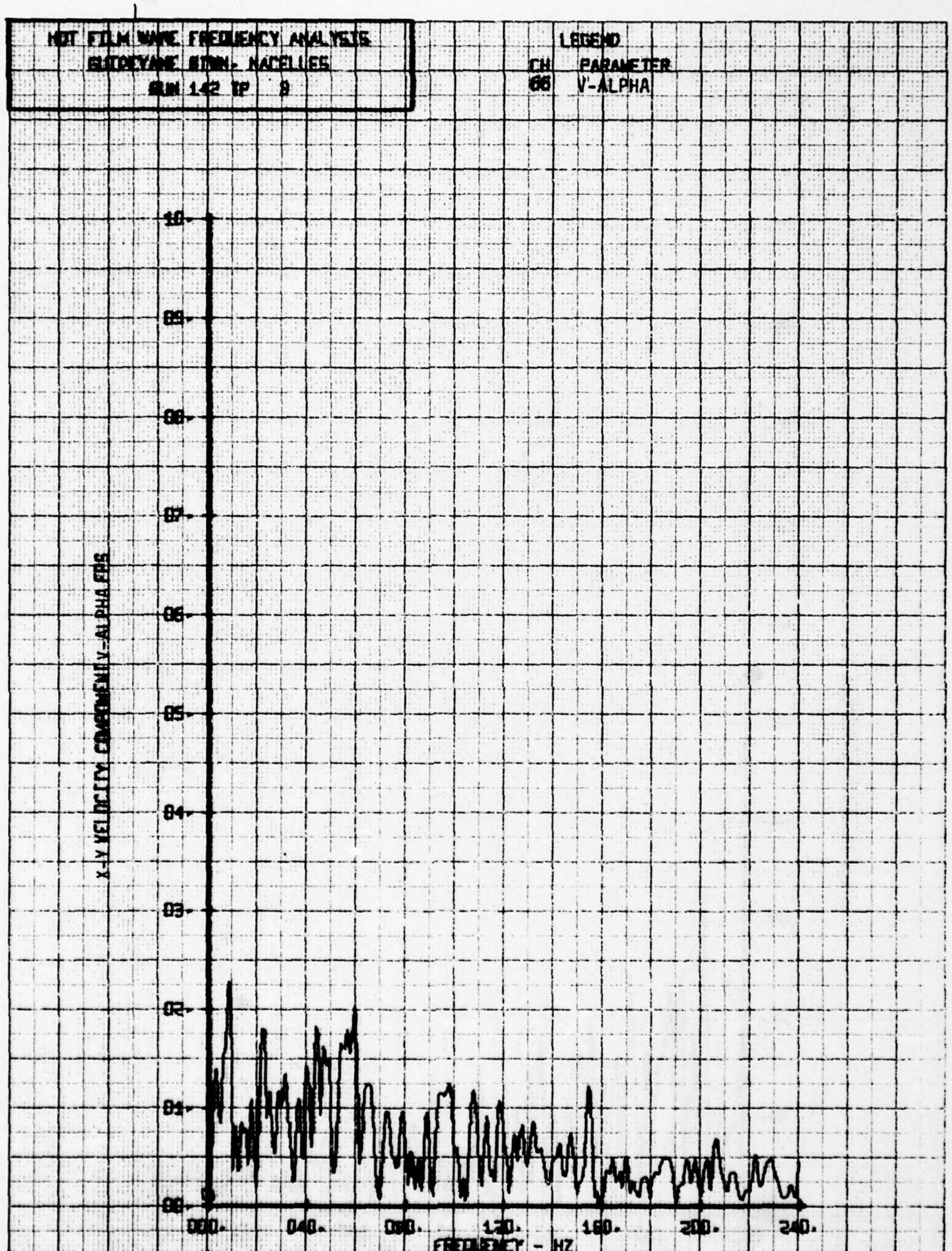
GUIDEVANE BTWN. NACELLES
RUN 142 TP 7
LEGEND
CH PARAMETER
66 V-ALPHA
X-Y VELOCITY COMPONENT V-ALPHA FPS
FREQUENCY - HZ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GUIDEVANE STRN. NACELLES
RUN 142 TP 9
LEGEND
CH PARAMETER
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X-Y VELOCITY COMPONENT V-ALPHA FPS
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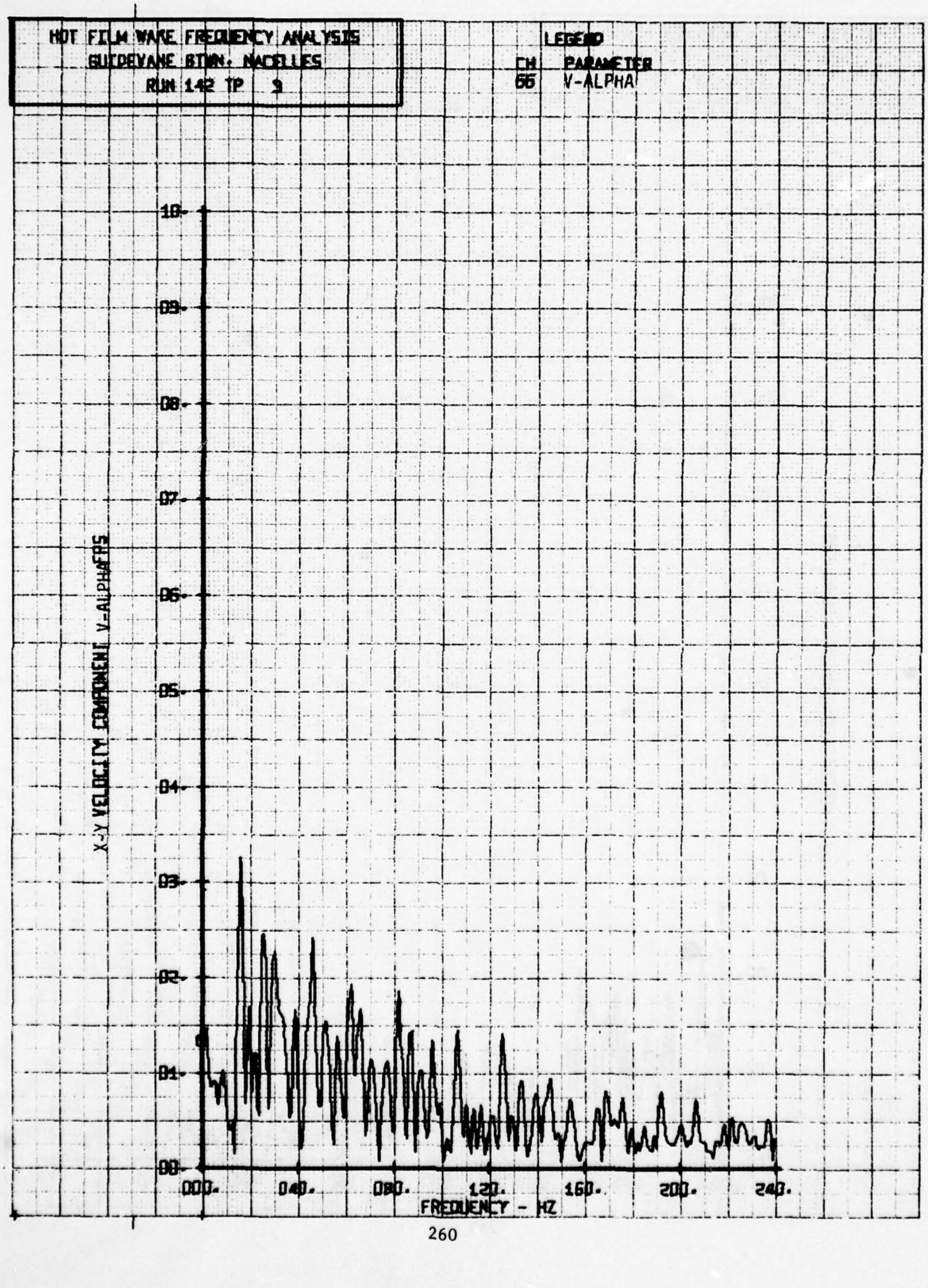
HOT FILM WAKE FREQUENCY ANALYSIS
GUIDEVANE BTWN. NACELLES
RUN 142 TP 9
LEGEND
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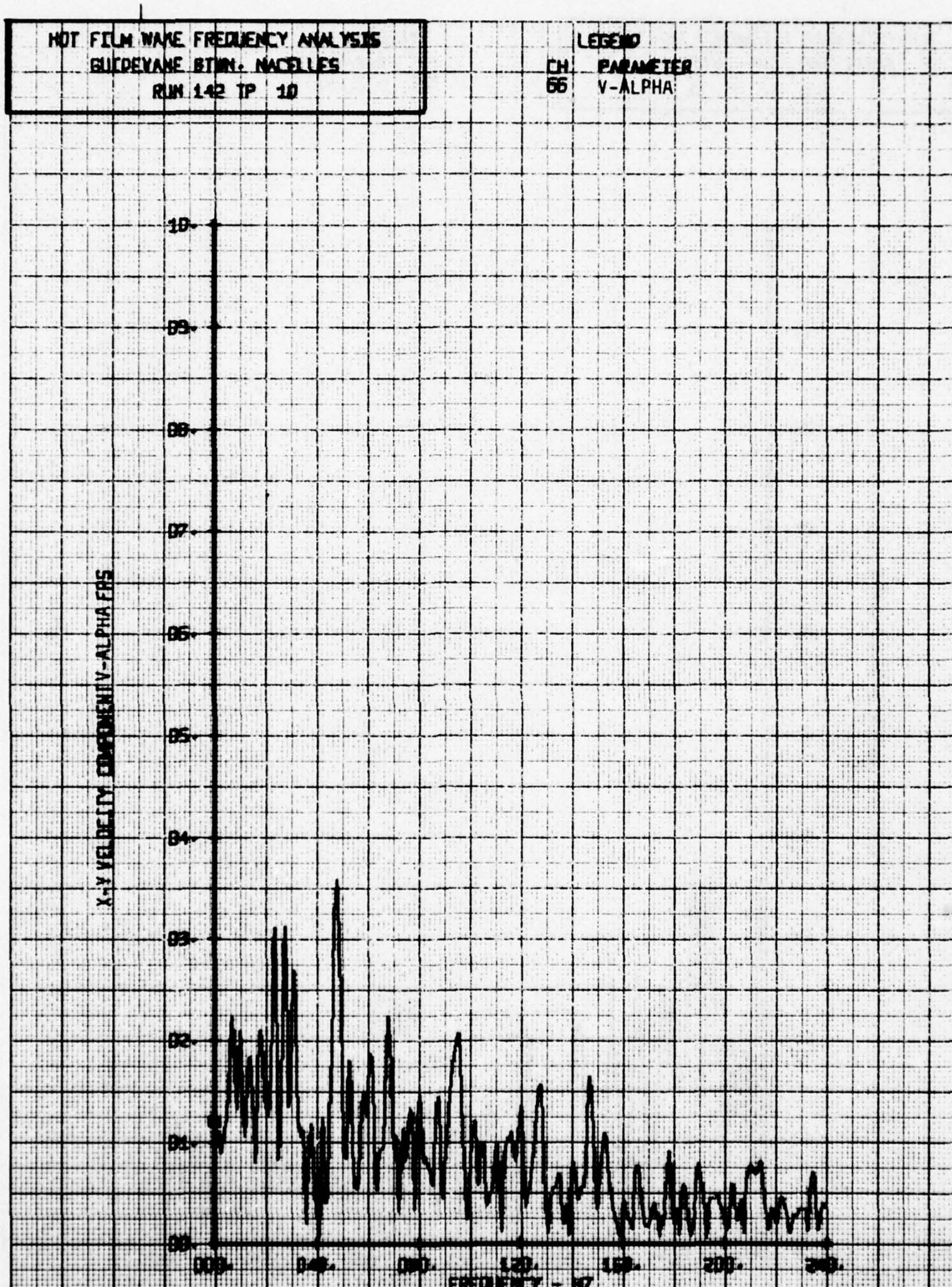

HOT FILM WAKE FREQUENCY ANALYSIS
GUIDEVANE BTWN. NACELLES
RUN 142 TP 10
LEGEND
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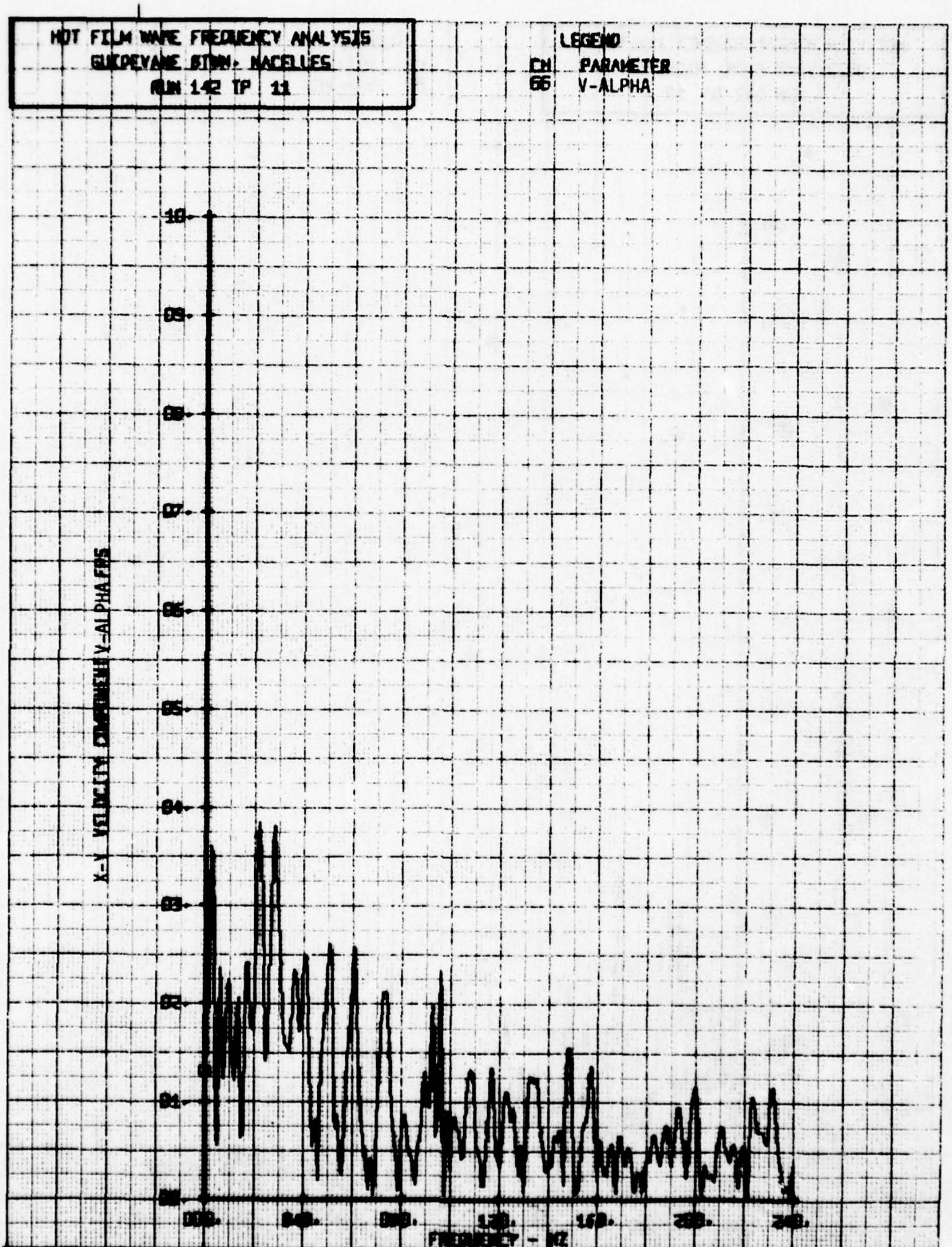
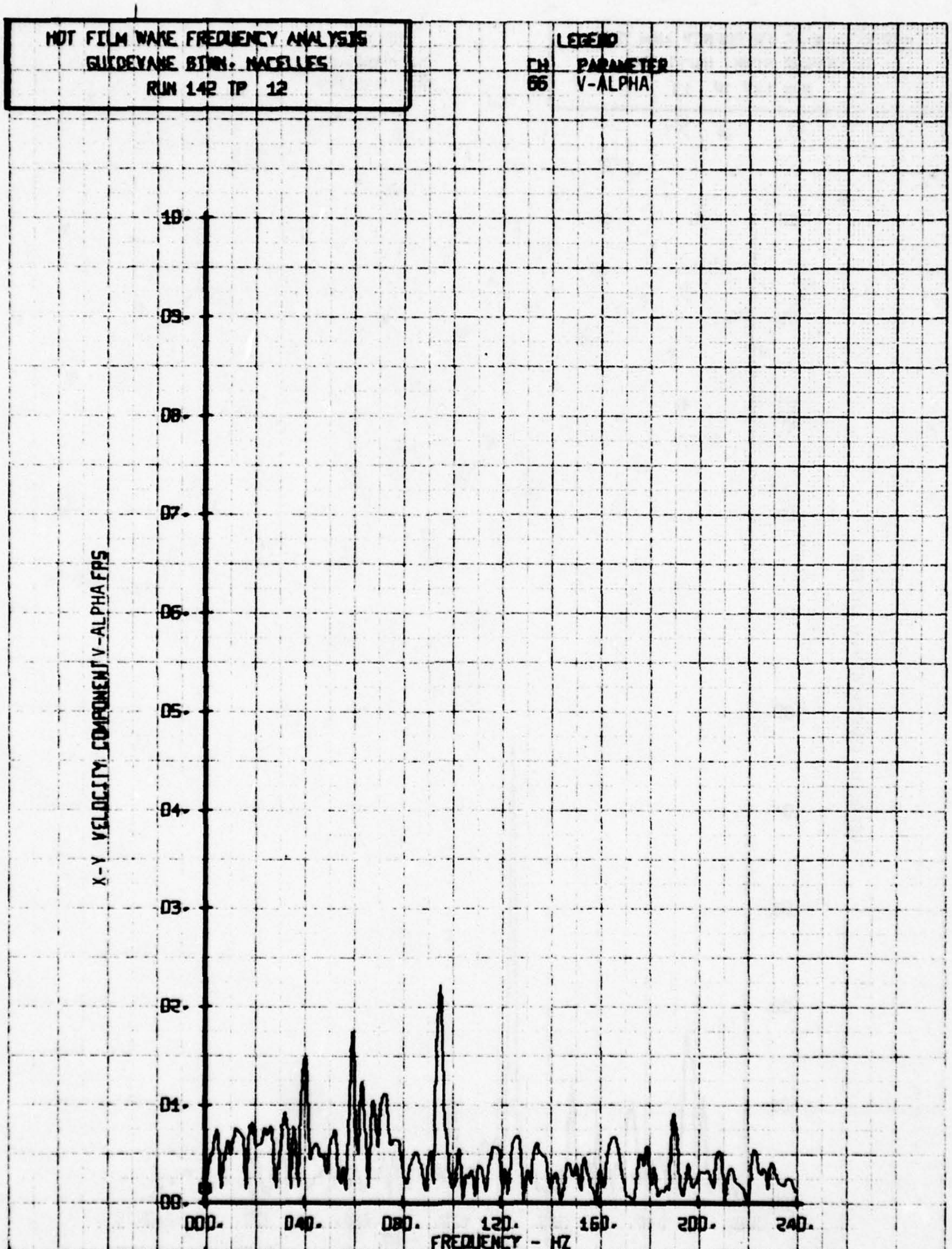
X-Y VELOCITY COMPONENT V-ALPHA FRS
FREQUENCY - HZ


HOT FILM WAKE FREQUENCY ANALYSIS
RUN 142 TP 11
LEGEND
CH PARAMETER
66 V-ALPHA


HOT FILM WAKE FREQUENCY ANALYSIS
GUIDEVANE BTWN. NACELLES
RUN 142 TP 12
LEGEND
CH PARAMETER
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X-Y VELOCITY COMPONENT V-ALPHA FPS
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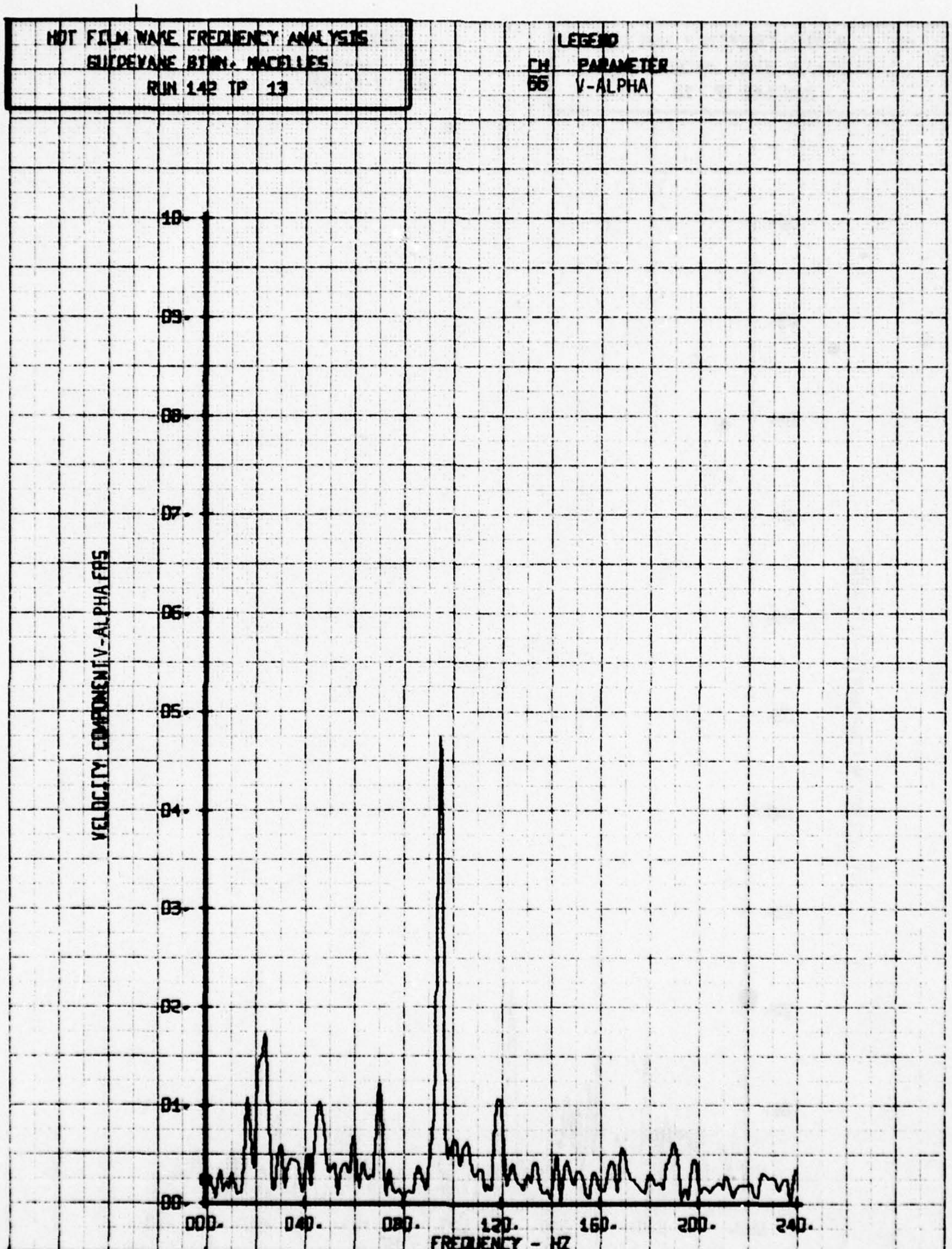
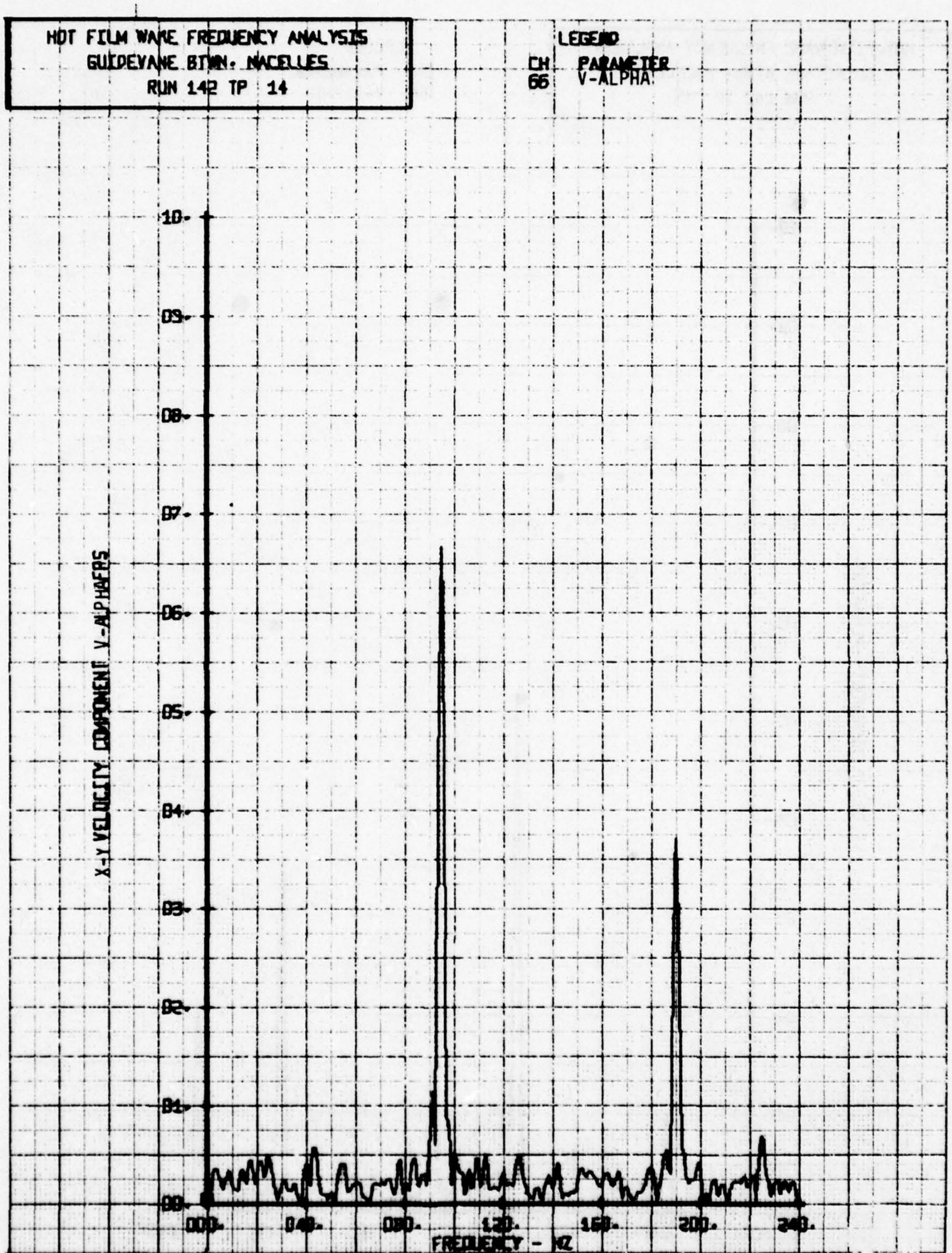


HOT FILM WAKE FREQUENCY ANALYSIS
GUIDEVANE BTWN. NACELLES
RUN 142 TP 13
LEGEND
CH PARAMETER
66 V-ALPHA
VELOCITY COMPONENT V-ALPHA FPS
FREQUENCY - HZ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GUIDEVANE BTWN. NACELLES
RUN 142 TP 14
LEGEND
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X-Y VELOCITY COMPONENT V-ALPHAFPS
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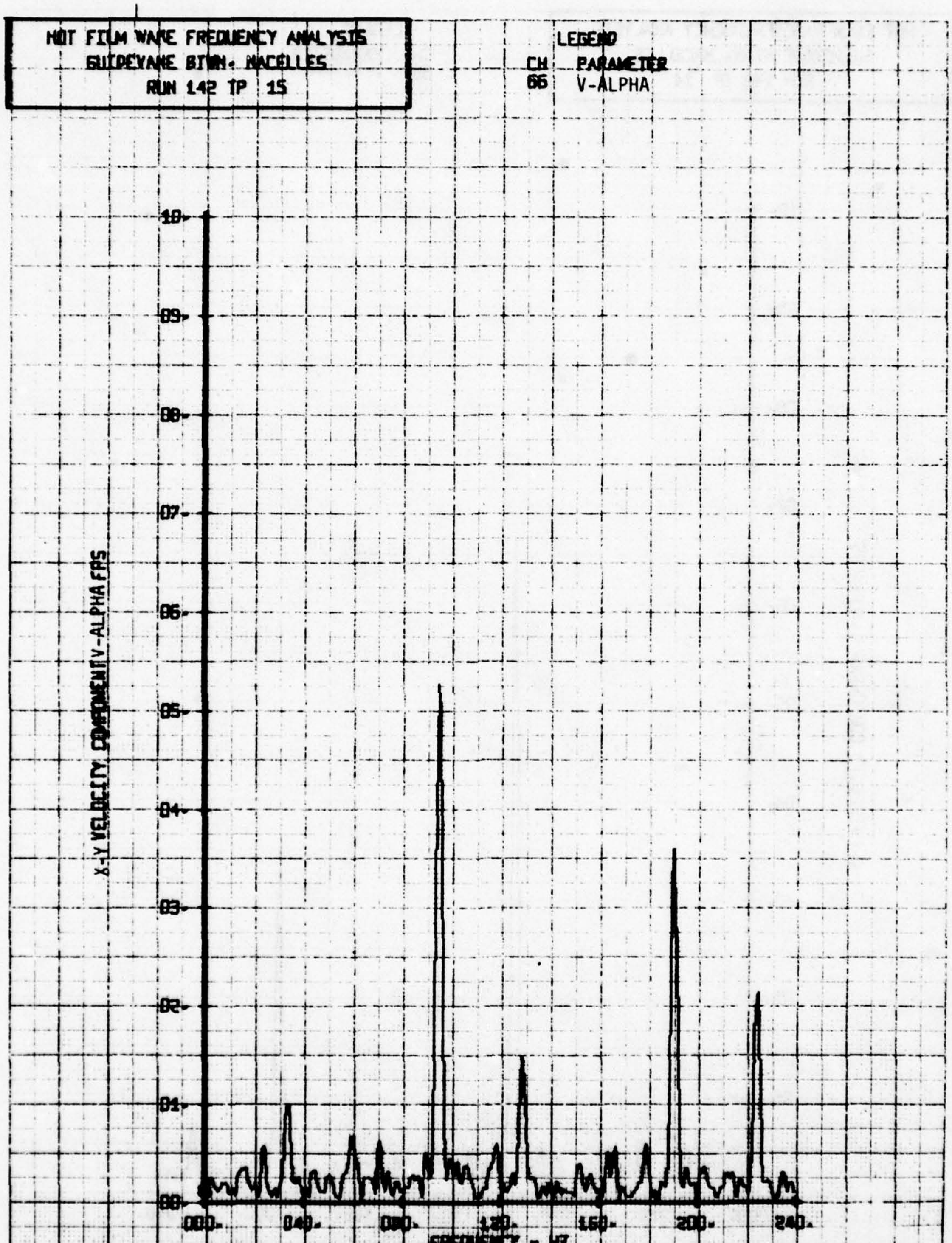
FREQUENCY - HZ



HOT FILM WAKE FREQUENCY ANALYSIS
GUIDEVANE BTWN. NACELLES
RUN 142 TP 15
LEGEND
CH PARAMETER
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X-Y VELOCITY COMPONENT V-ALPHA FPS
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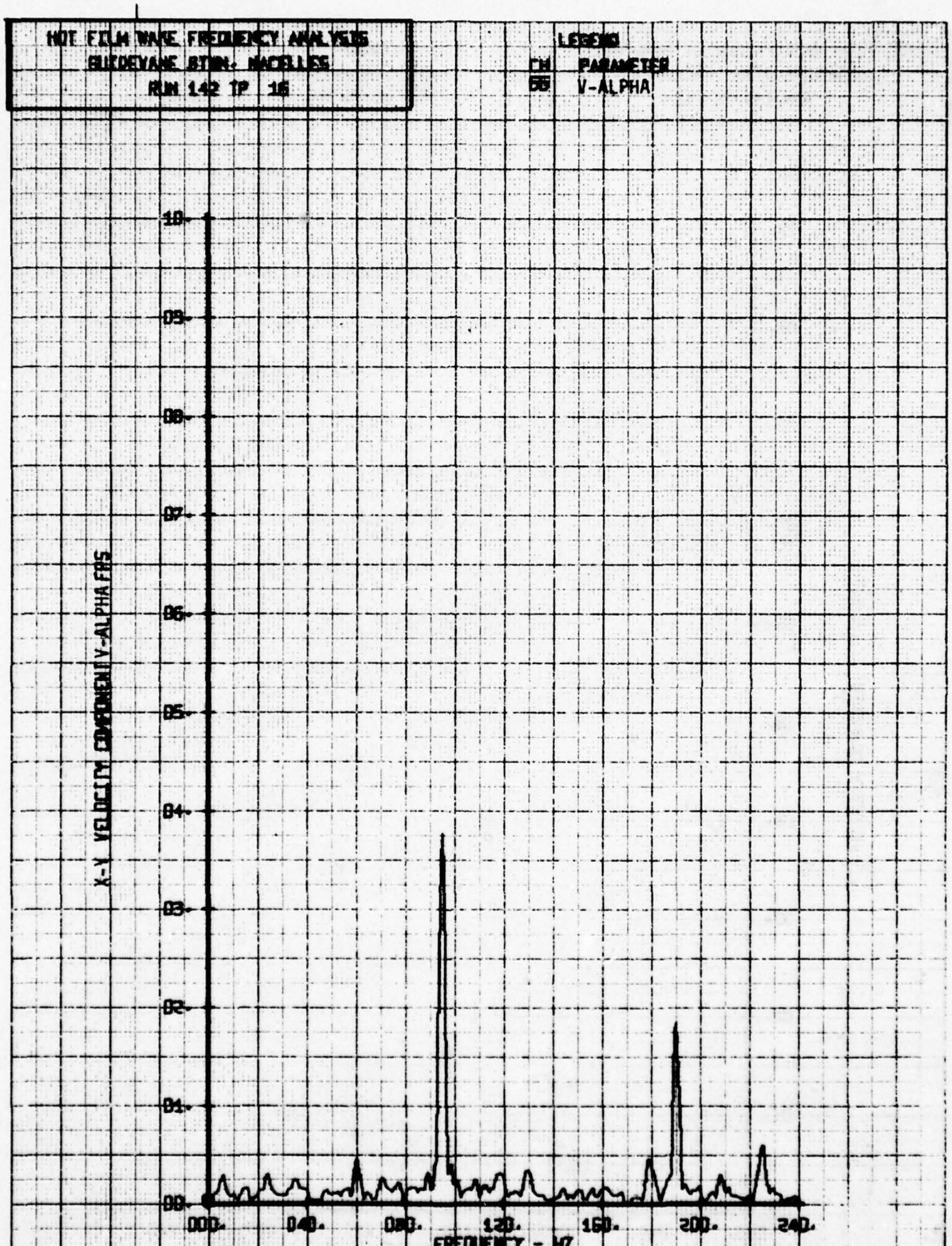
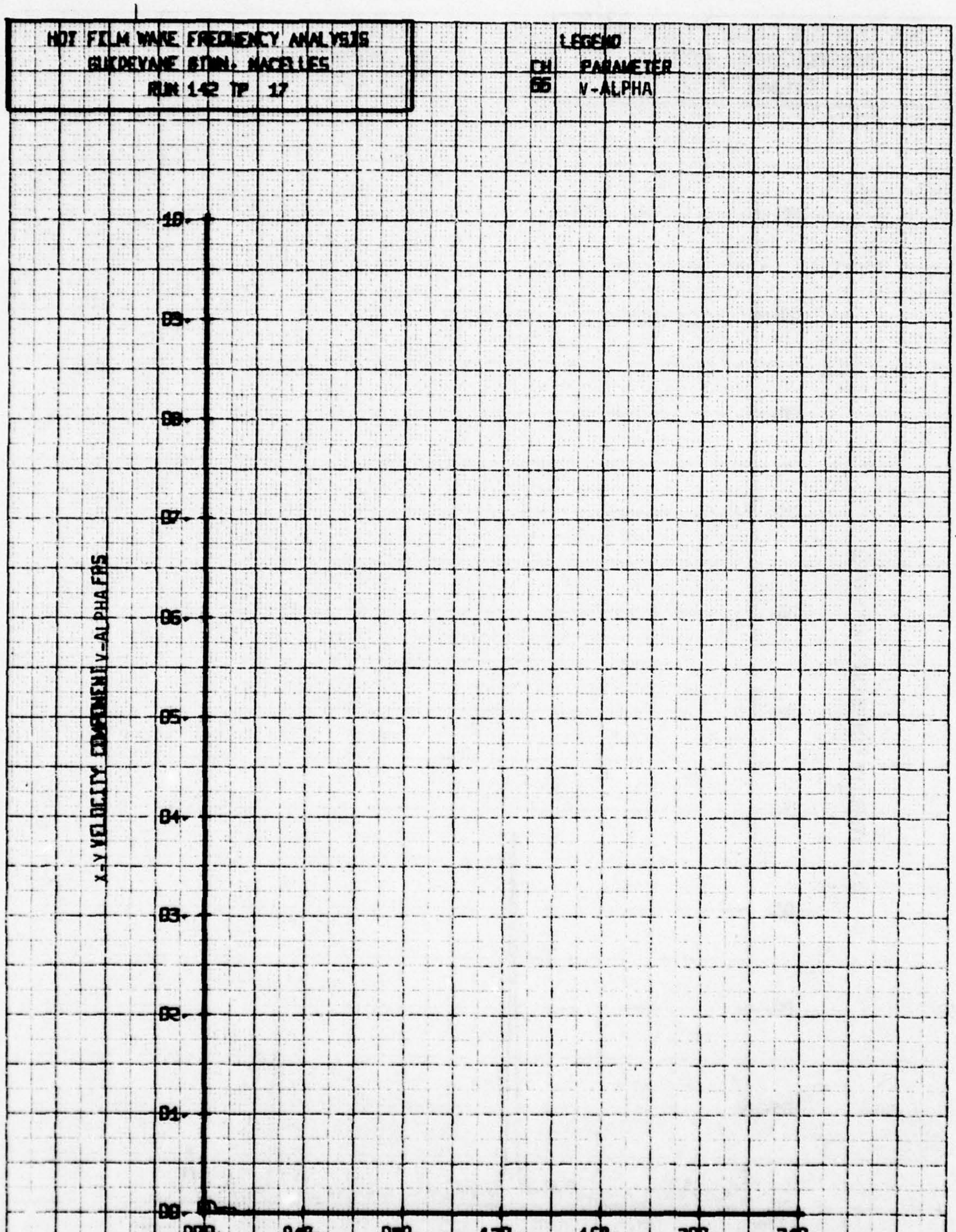

HOT FILM WAKE FREQUENCY ANALYSIS
GUIDEVANE BTWN. NACELLES
RUN 142 TP 16
LEGEND
CH PARAMETER
56 V-ALPHA
X-Y VELOCITY COMPONENT V-ALPHA FPS
FREQUENCY - HZ


HOT FILM WAKE FREQUENCY ANALYSIS
GUIDEVANE @TMN. NACELLES
RUN 142 TP 17
LEGEND
CH PARAMETER
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X-Y VELOCITY COMPONENT V-ALPHA FPS
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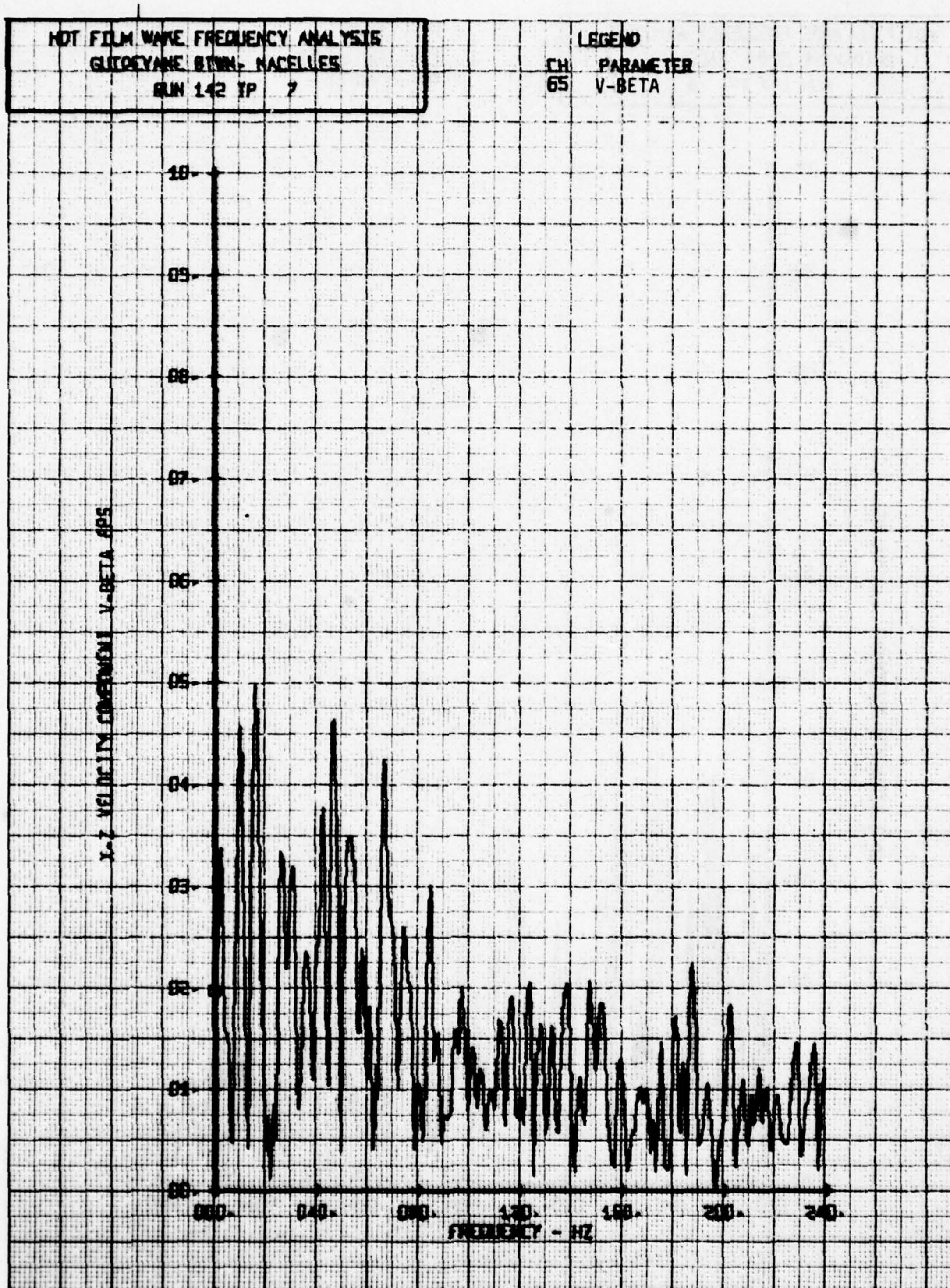
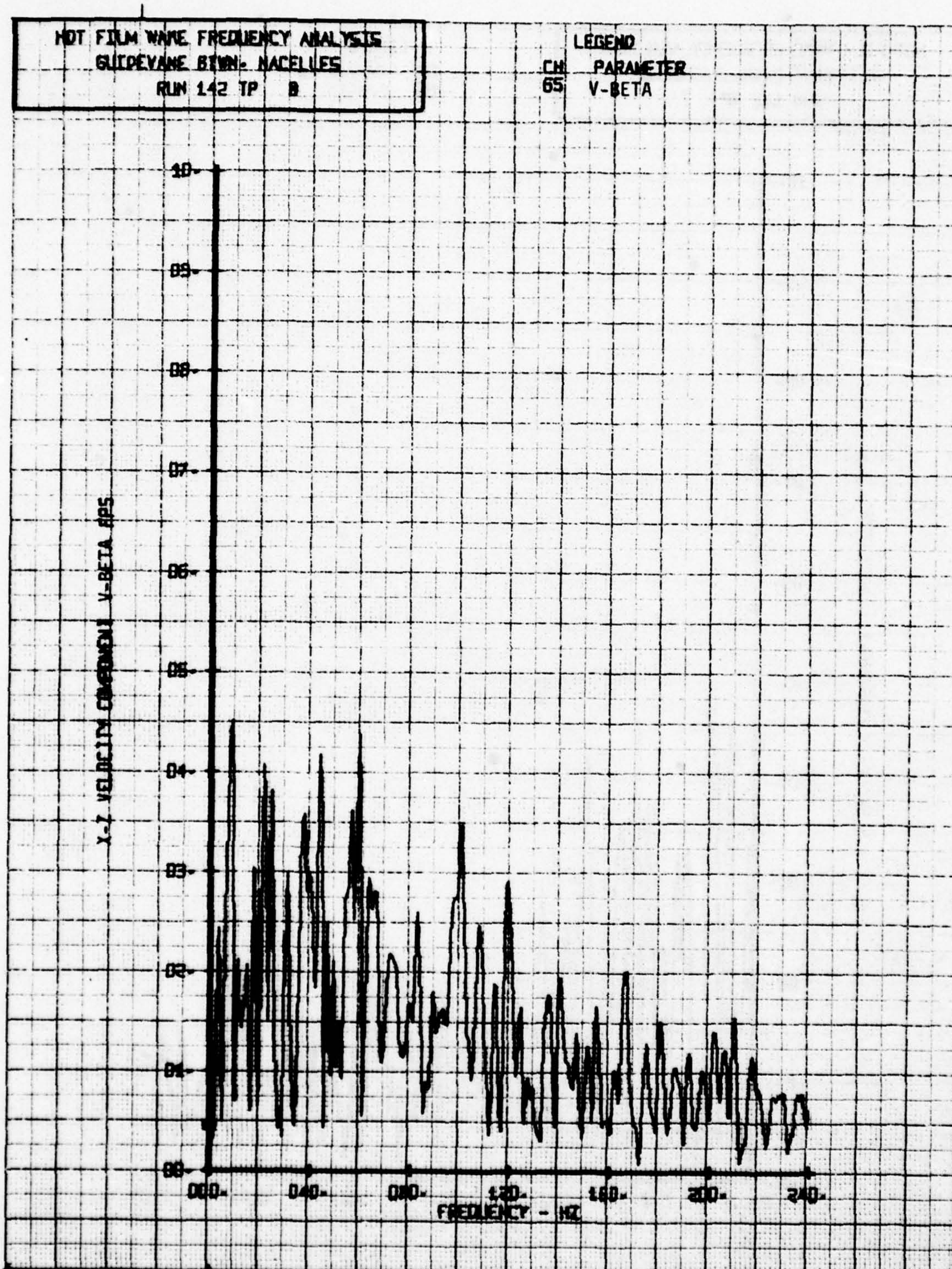
FREQUENCY - HZ



HOT FILM WAKE FREQUENCY ANALYSIS
GUIDEVANE BTWN. NACELLES
RUN 142 TP 7
LEGEND
CH PARAMETER
65 V-BETA
X-Y VELOCITY COMPONENT V-BETA FPS
FREQUENCY - HZ


HOT FILM WAKE FREQUENCY ANALYSIS
GUIDEVANE BTWN. NACELLES
RUN 142 TP B
LEGEND
CH PARAMETER
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X-Z VELOCITY COMPONENT V-BETA RPS
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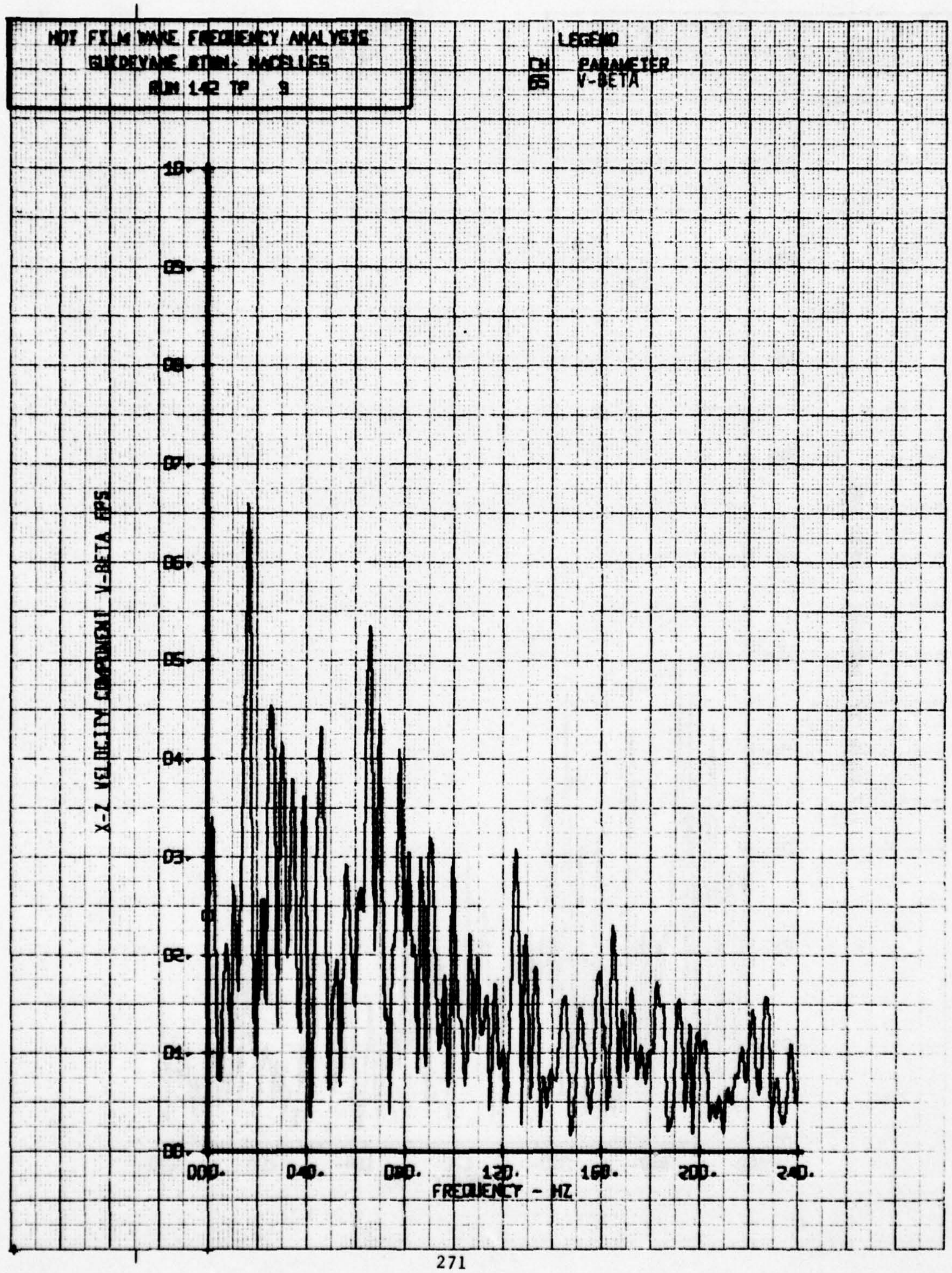

HOT FILM WAKE FREQUENCY ANALYSIS
GUIDEVANE BTWN. NACELLES
RUN 142 TP 9
LEGEND
CH PARAMETER
65 V-BETA
X-Z VELOCITY COMPONENT V-BETA FPS
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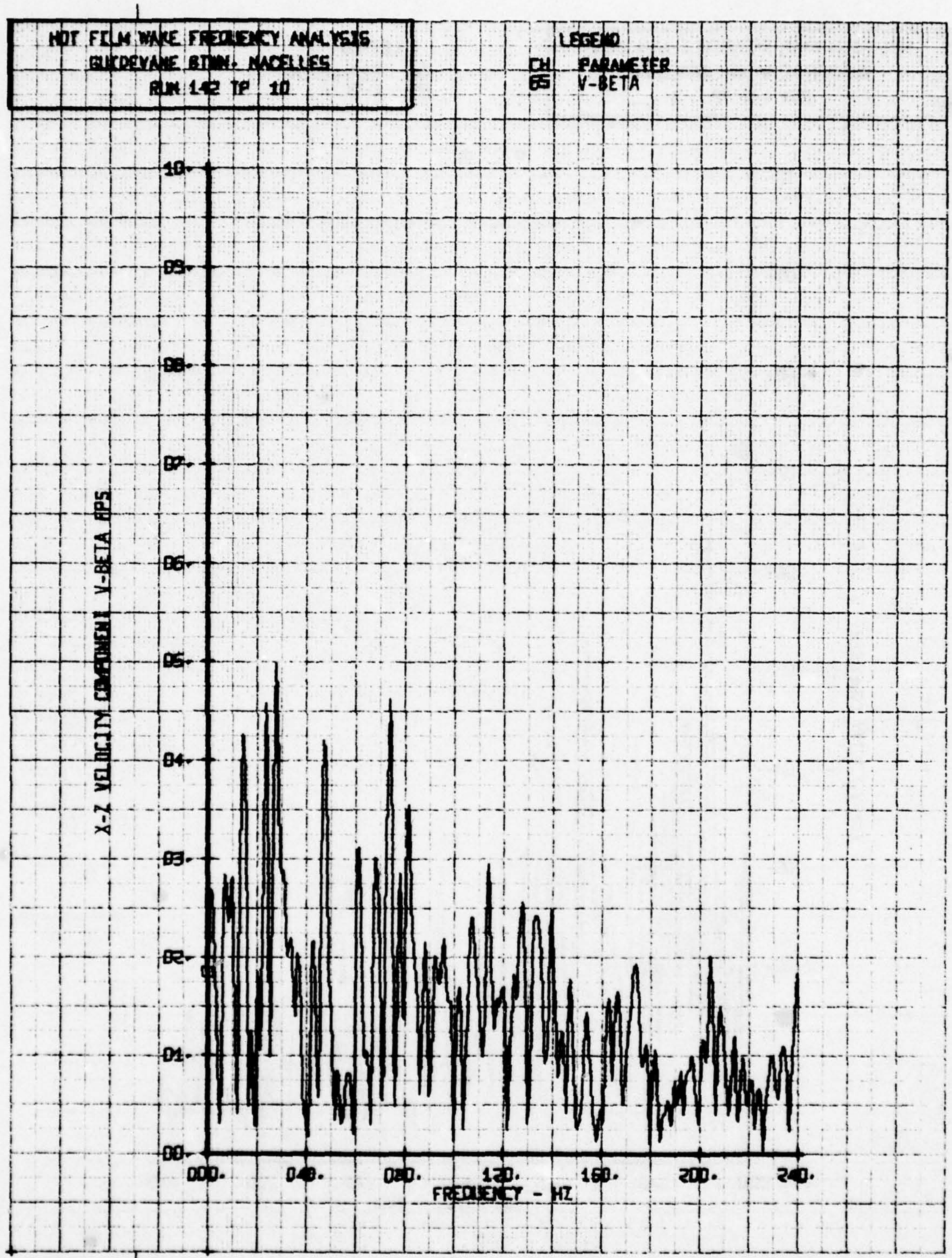
FREQUENCY - HZ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GUIDEVANE BTWN. NACELLES
RUN 142 TP 10
LEGEND
CH PARAMETER
65 V-BETA
X-Z VELOCITY COMPONENT V-BETA FPS
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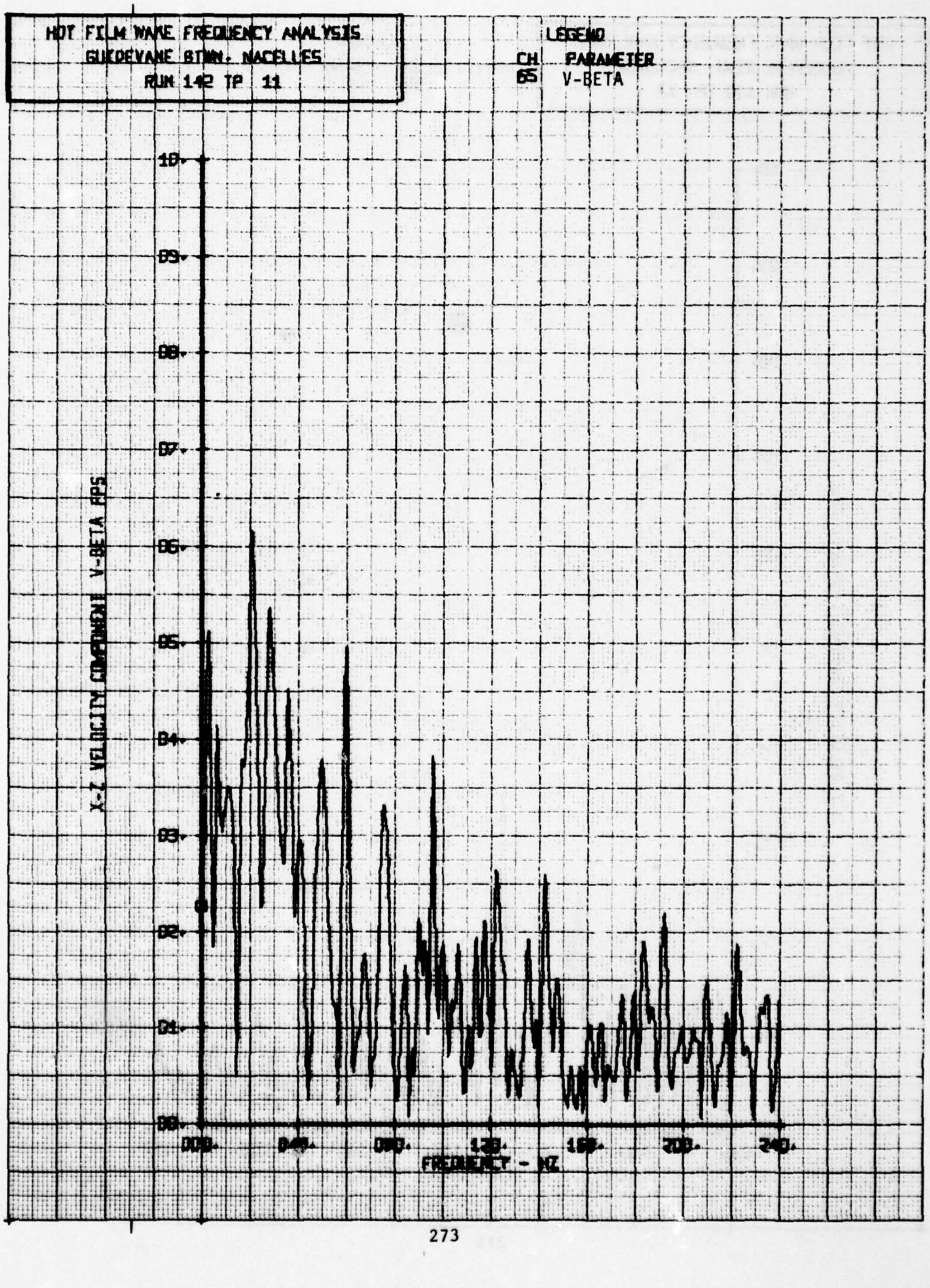
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GUIDEVANE BTWN. NACELLES
RUN 142 TP 11
LEGEND
CH PARAMETER
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X-Z VELOCITY COMPONENT V-BETA FPS
FREQUENCY - HZ
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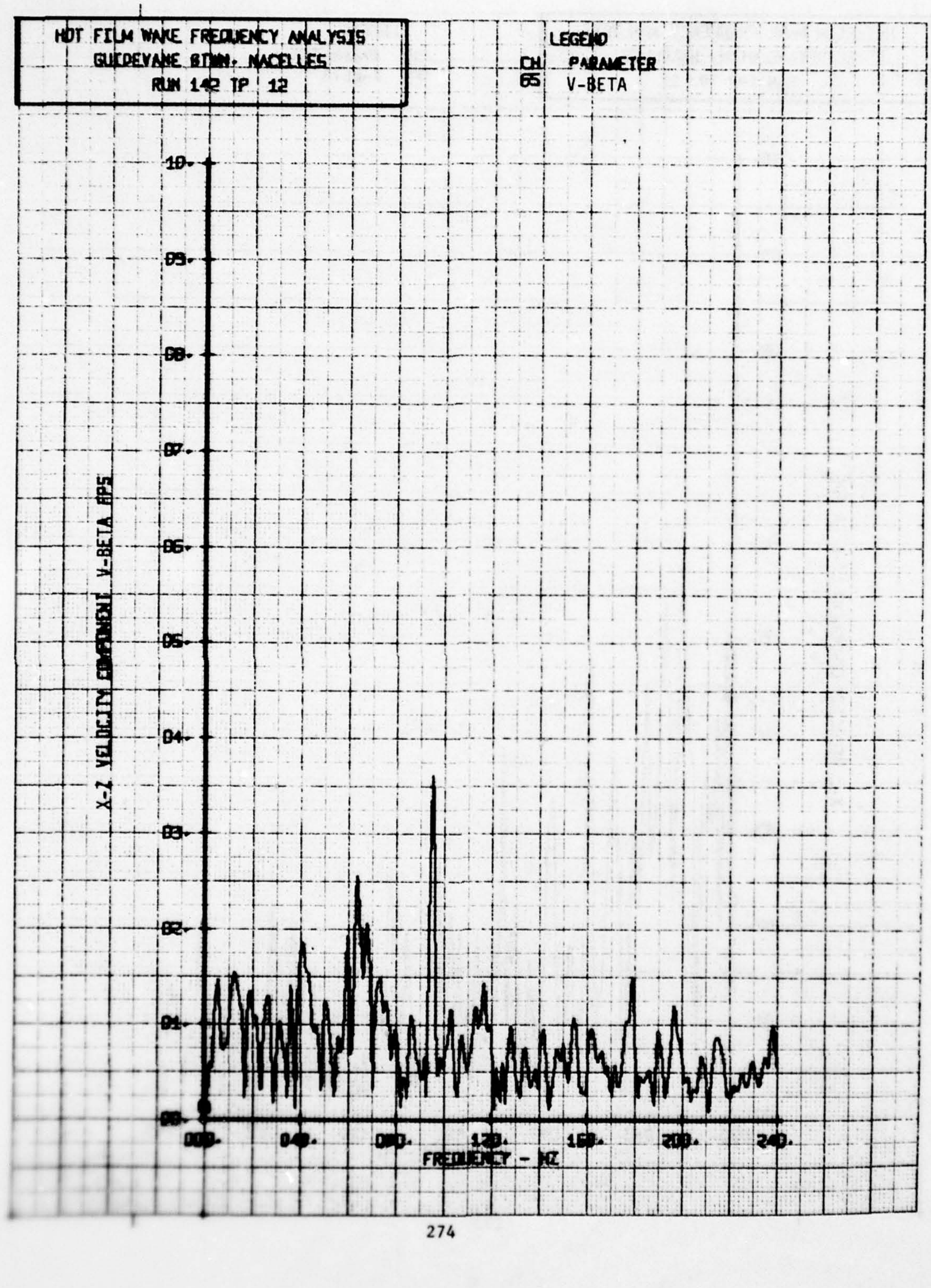
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LEGEND
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X-Z VELOCITY COMPONENT V-BETA FPS
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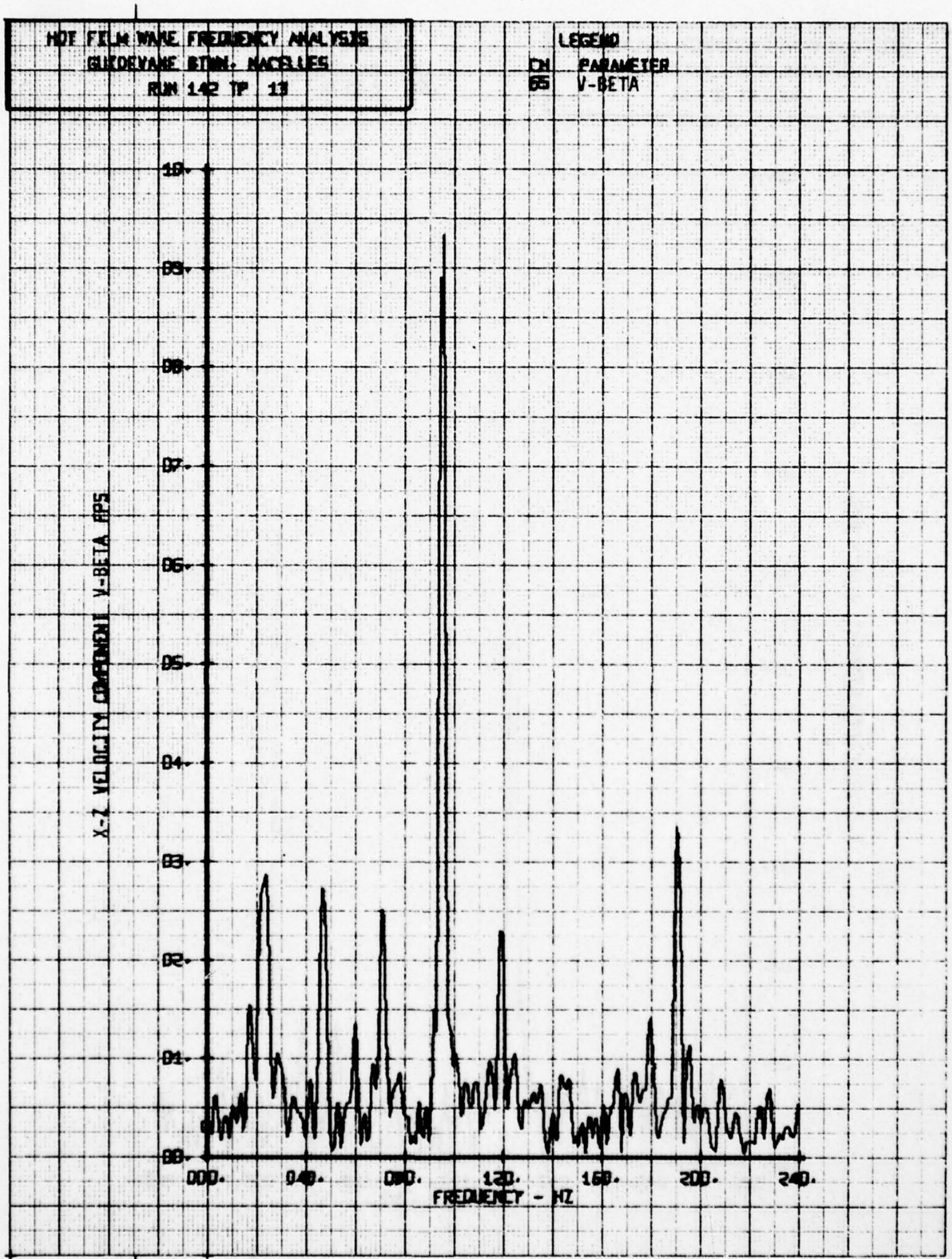

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GUIDEVANE BTWN. NACELLES
RUN 142 TP 13
LEGEND
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X-Z VELOCITY COMPONENT V-BETA RPS
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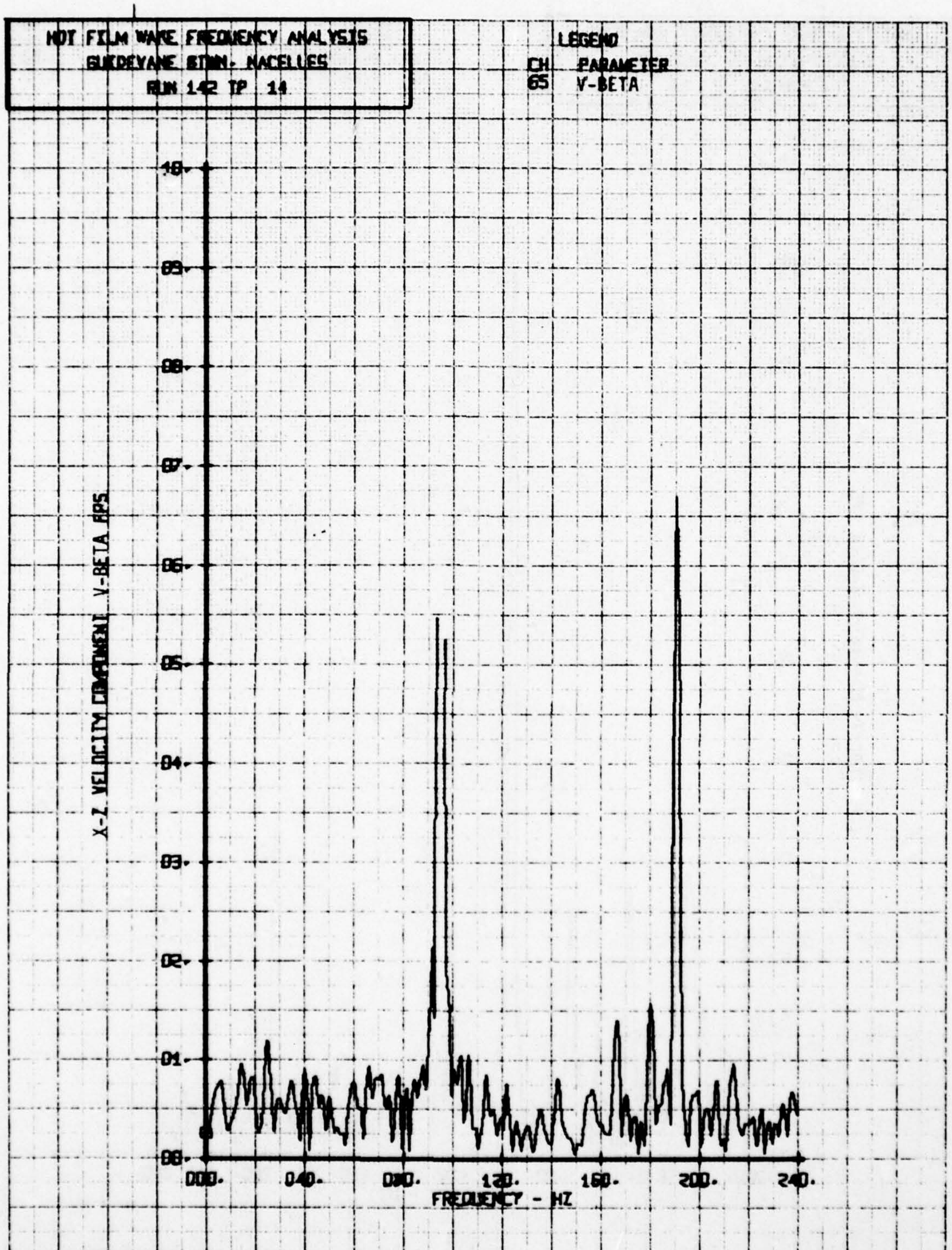
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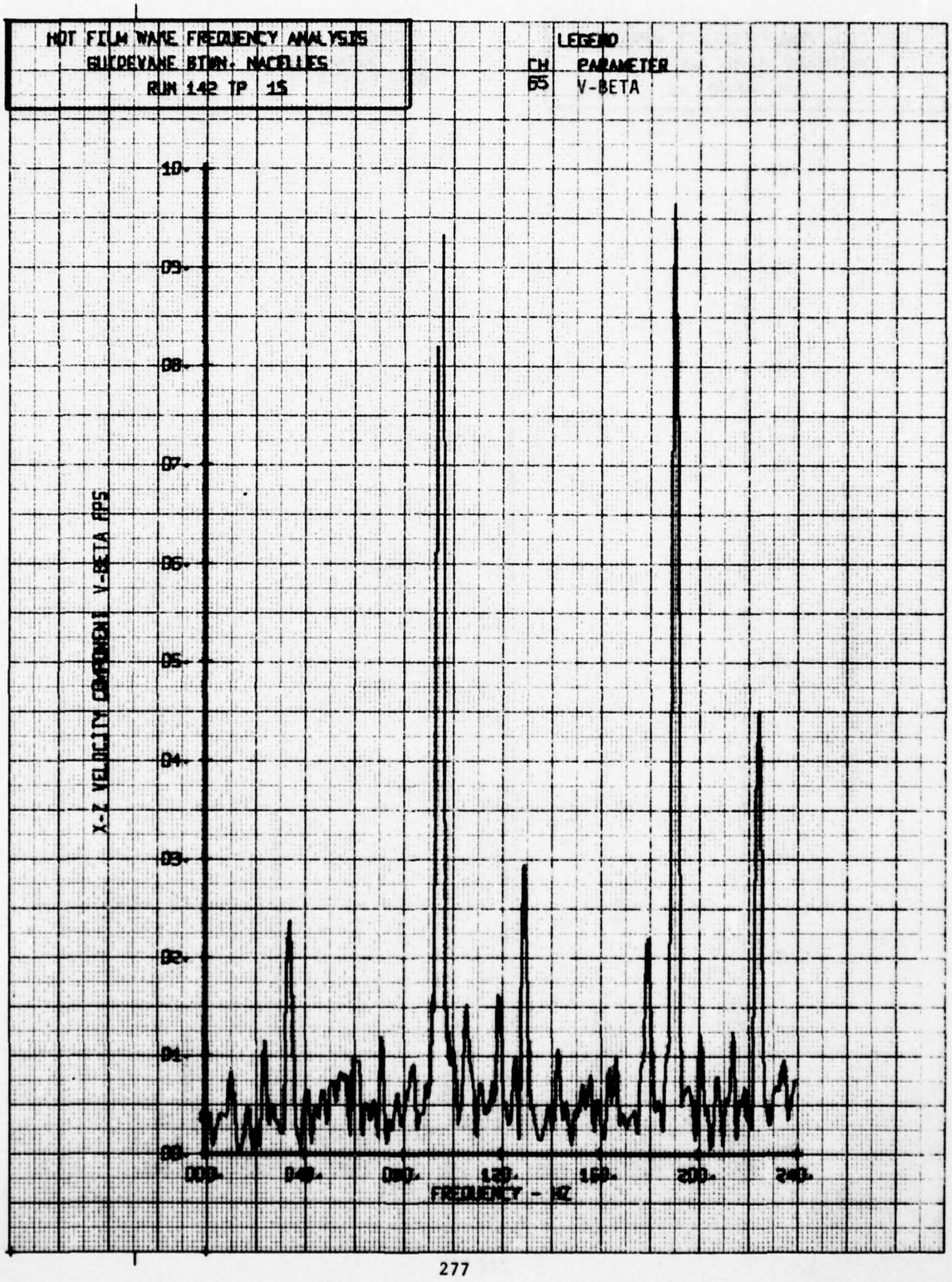
X-Z VELOCITY COMPONENT V-BETA RPS
FREQUENCY - HZ



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GUIDEVANE BTWN. NACELLES
RUN 142 TP 15
LEGEND
CH PARAMETER
65 V-BETA
X-Z VELOCITY COMPONENT V-BETA RMS
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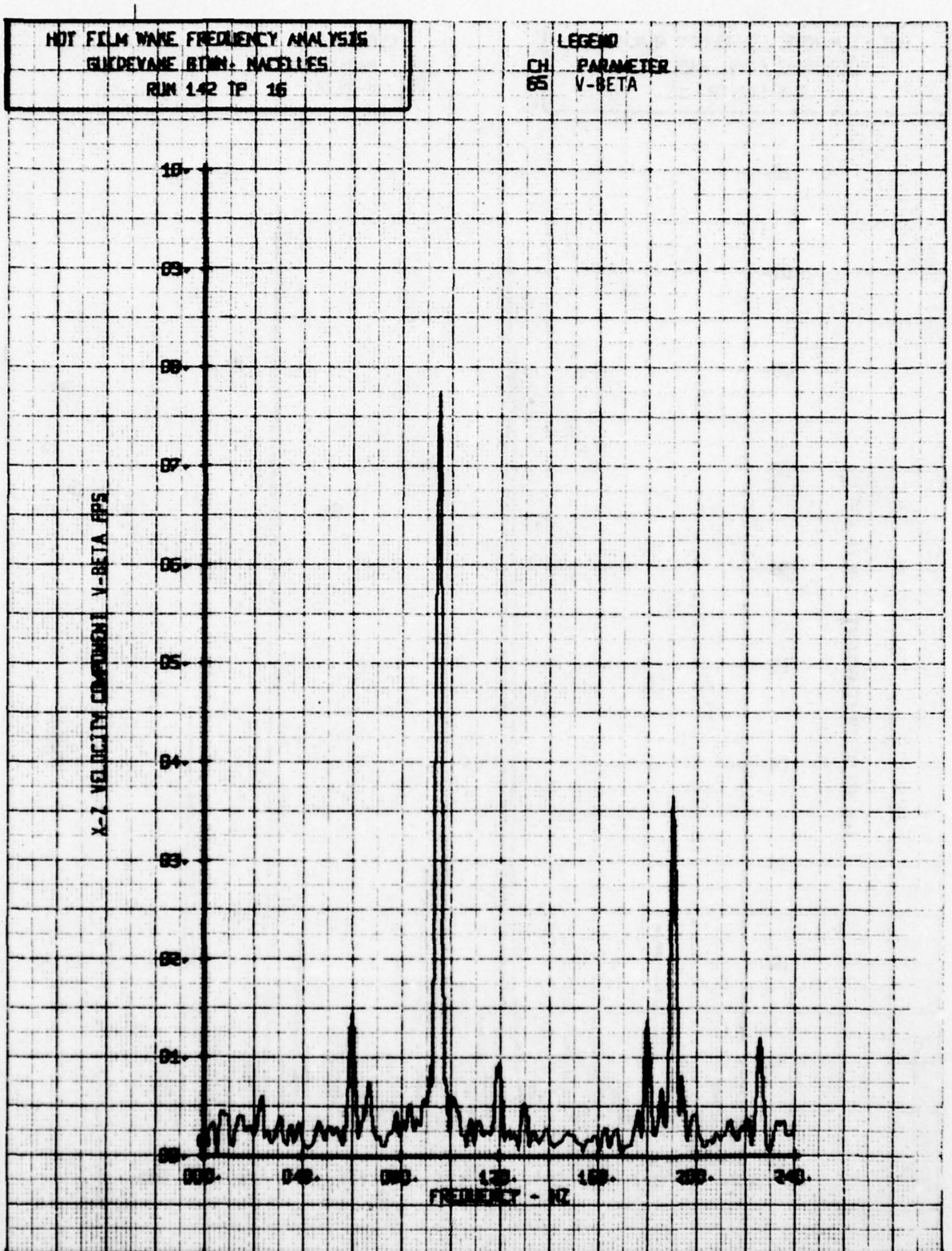

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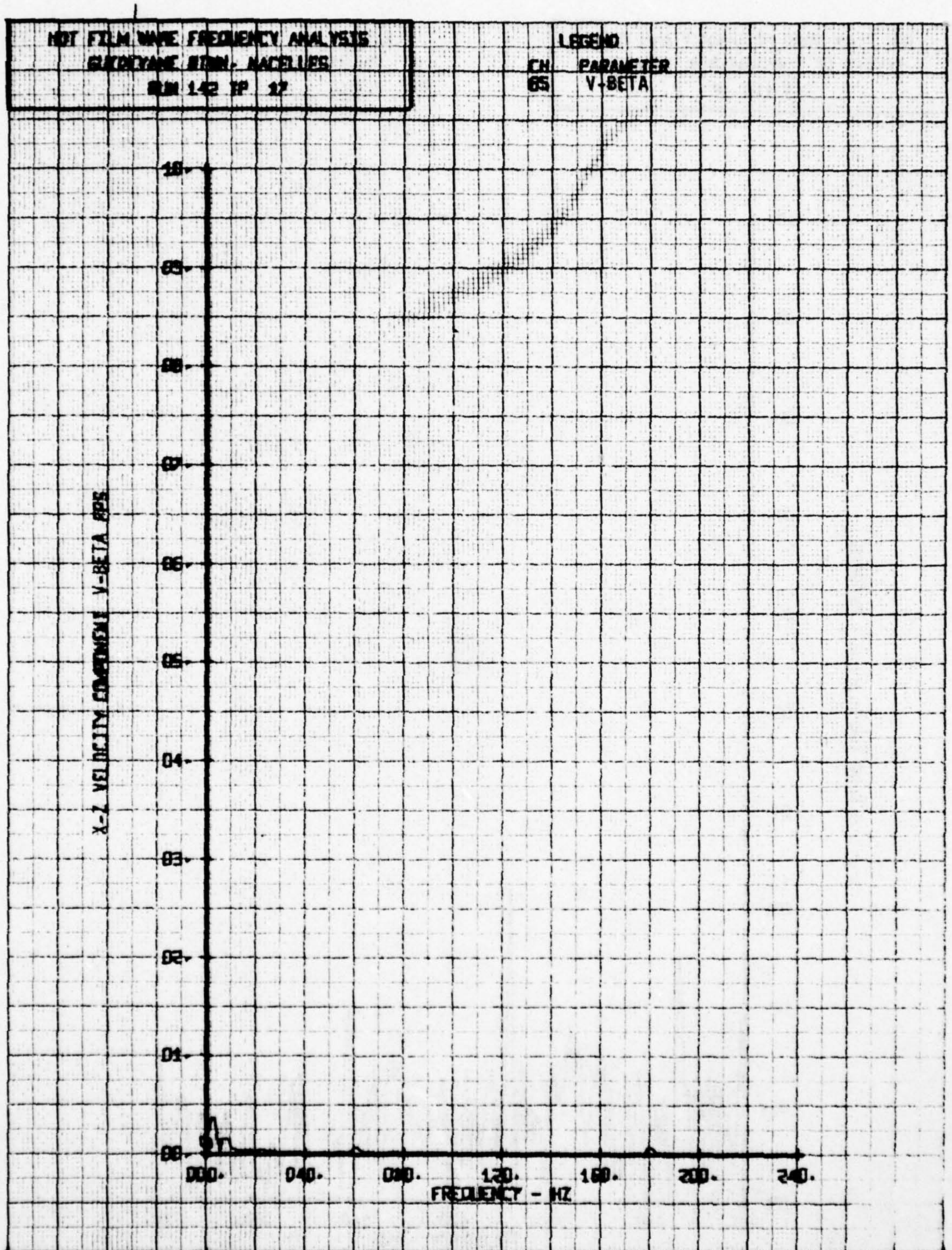
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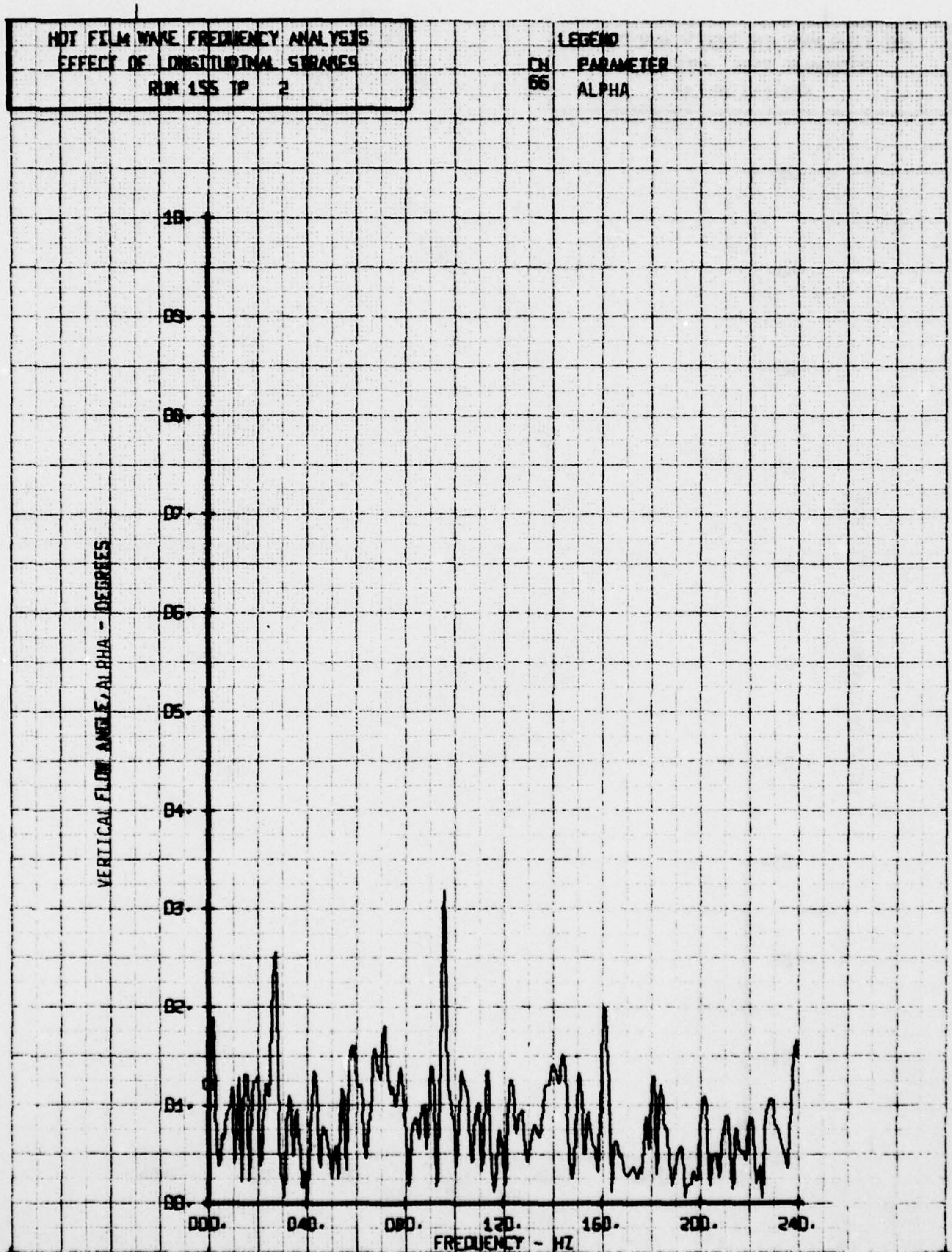
LEGEND
CH PARAMETER
65 V-BETA
X-Z VELOCITY
V-BETA
FREQUENCY - HZ



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EFFECT OF LONGITUDINAL STRAKES
RUN 155 TP 2
LEGEND
CH PARAMETER
66 ALPHA
VERTICAL FLOW ANGLE, ALPHA - DEGREES
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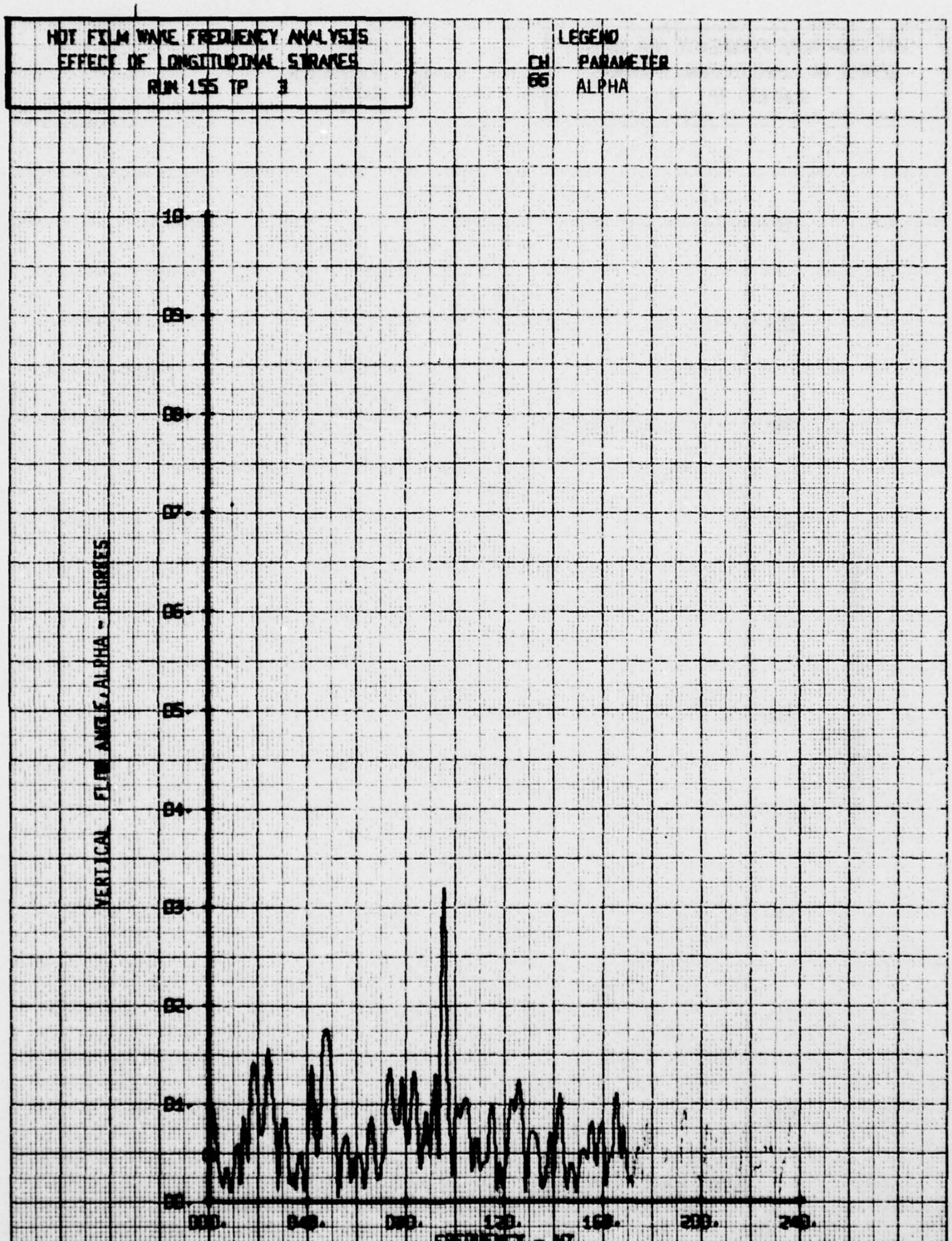
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RUN 155 TP 3
LEGEND
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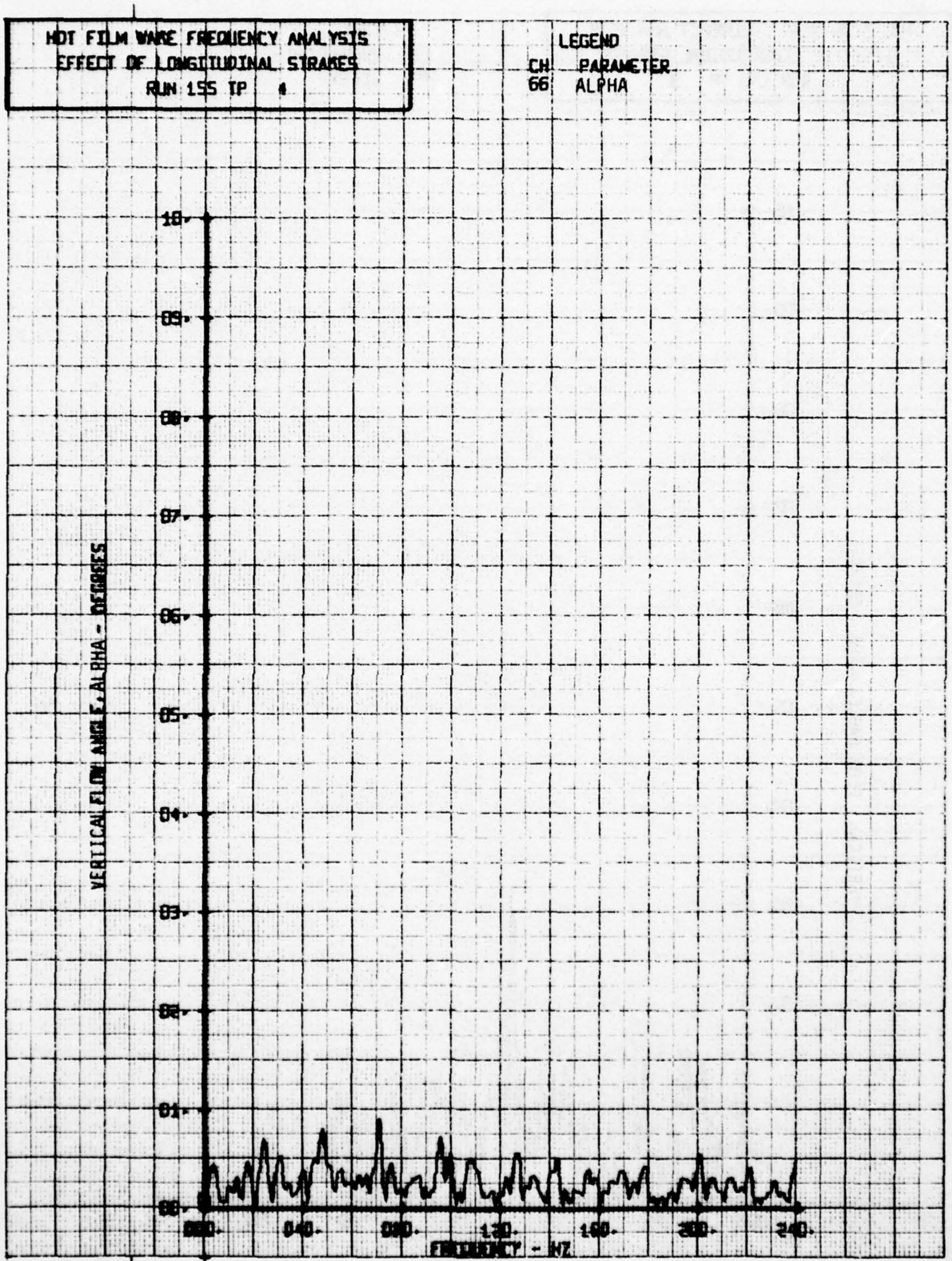
VERTICAL FLOW ANGLE,ALPHA - DEGREES
FREQUENCY - HZ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EFFECT OF LONGITUDINAL STRAKES
RUN 155 TP 4
LEGEND
CH PARAMETER
66 ALPHA
VERTICAL FLOW ANGLE, ALPHA - DEGREES
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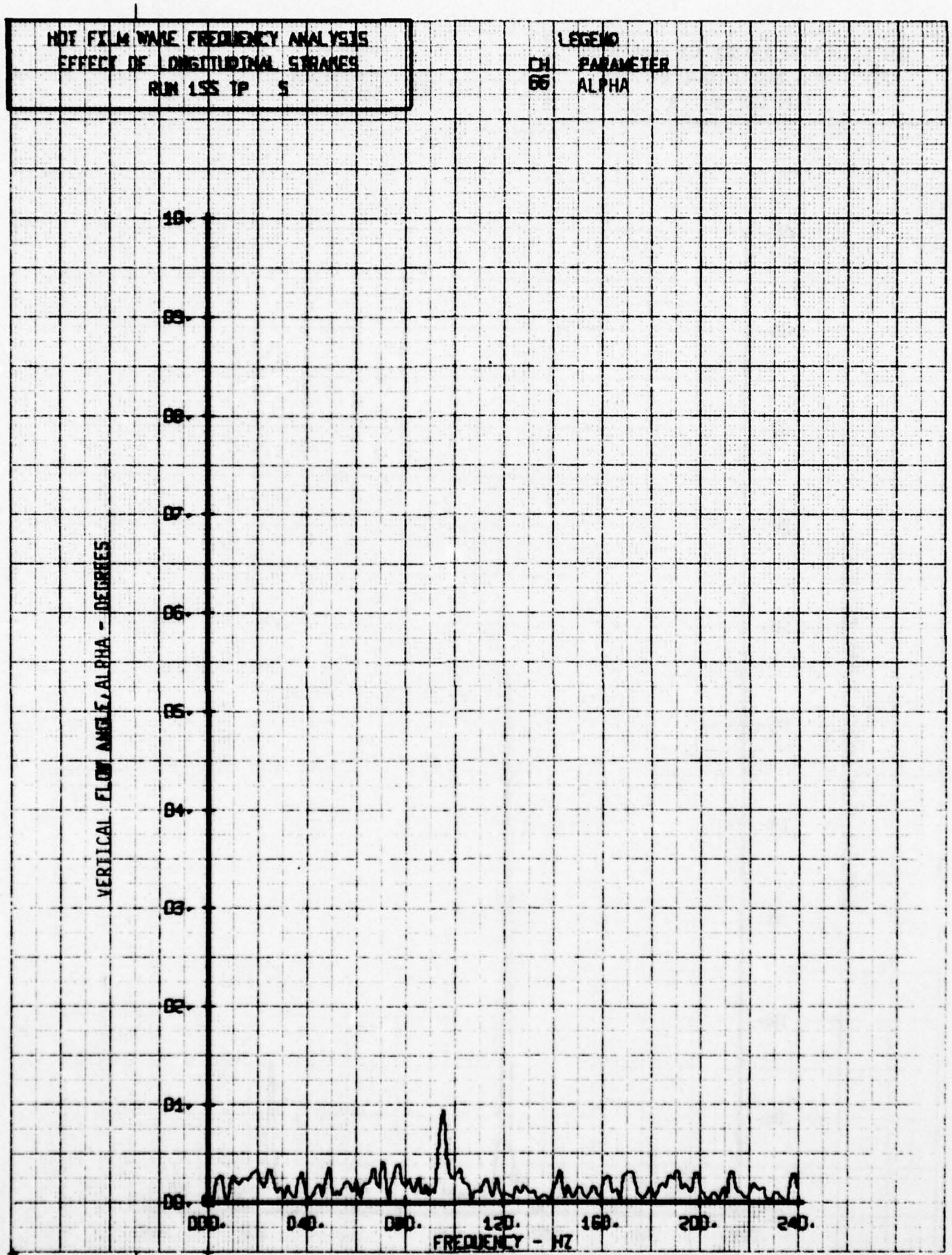
FREQUENCY - HZ



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RUN 155 TP 5
LEGEND
CH PARAMETER
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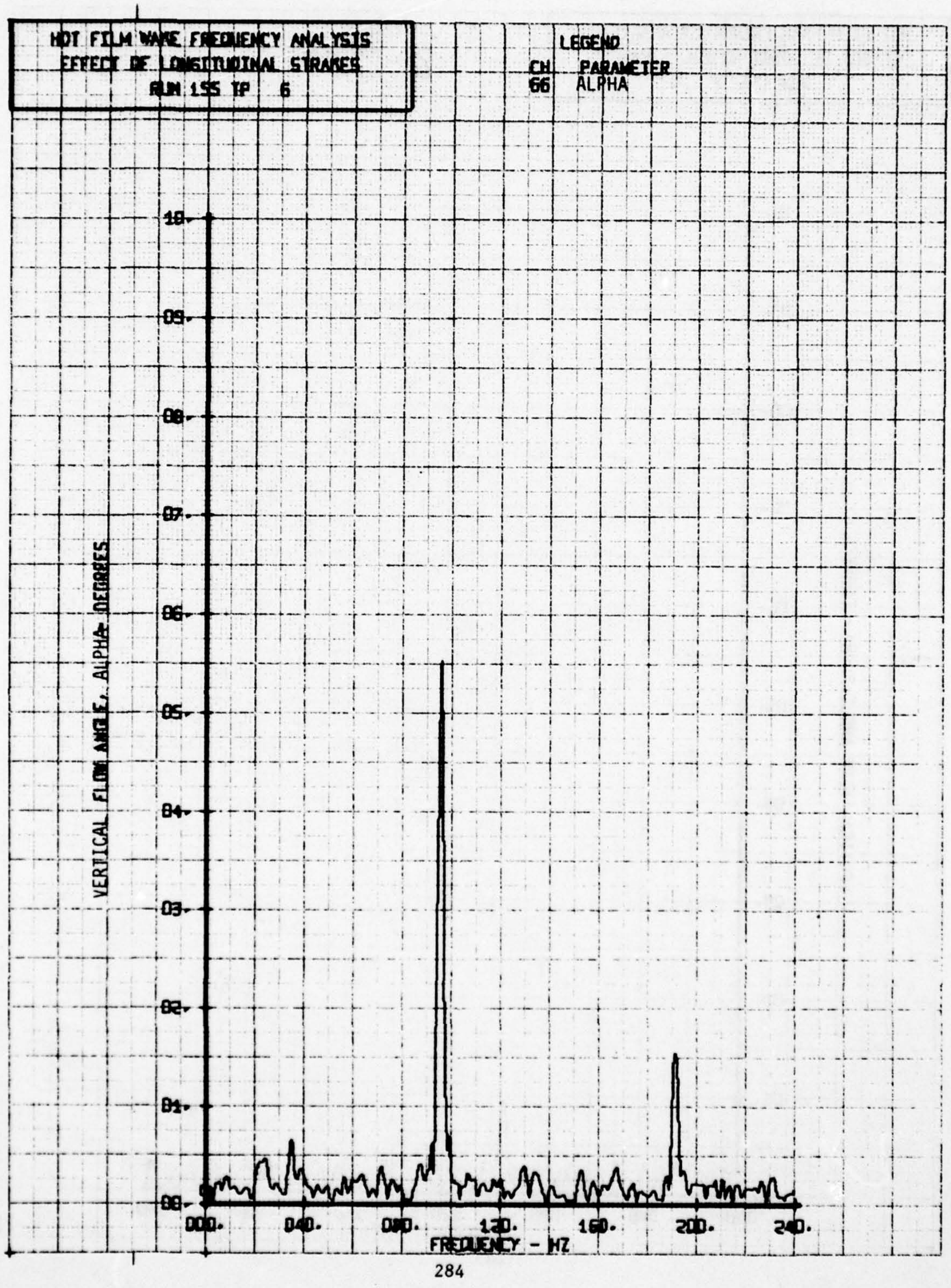
VERTICAL FLOW ANGLE, ALPHA - DEGREES
FREQUENCY - HZ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EFFECT OF LONGITUDINAL STRAKES
RUN 155 TP 6
LEGEND
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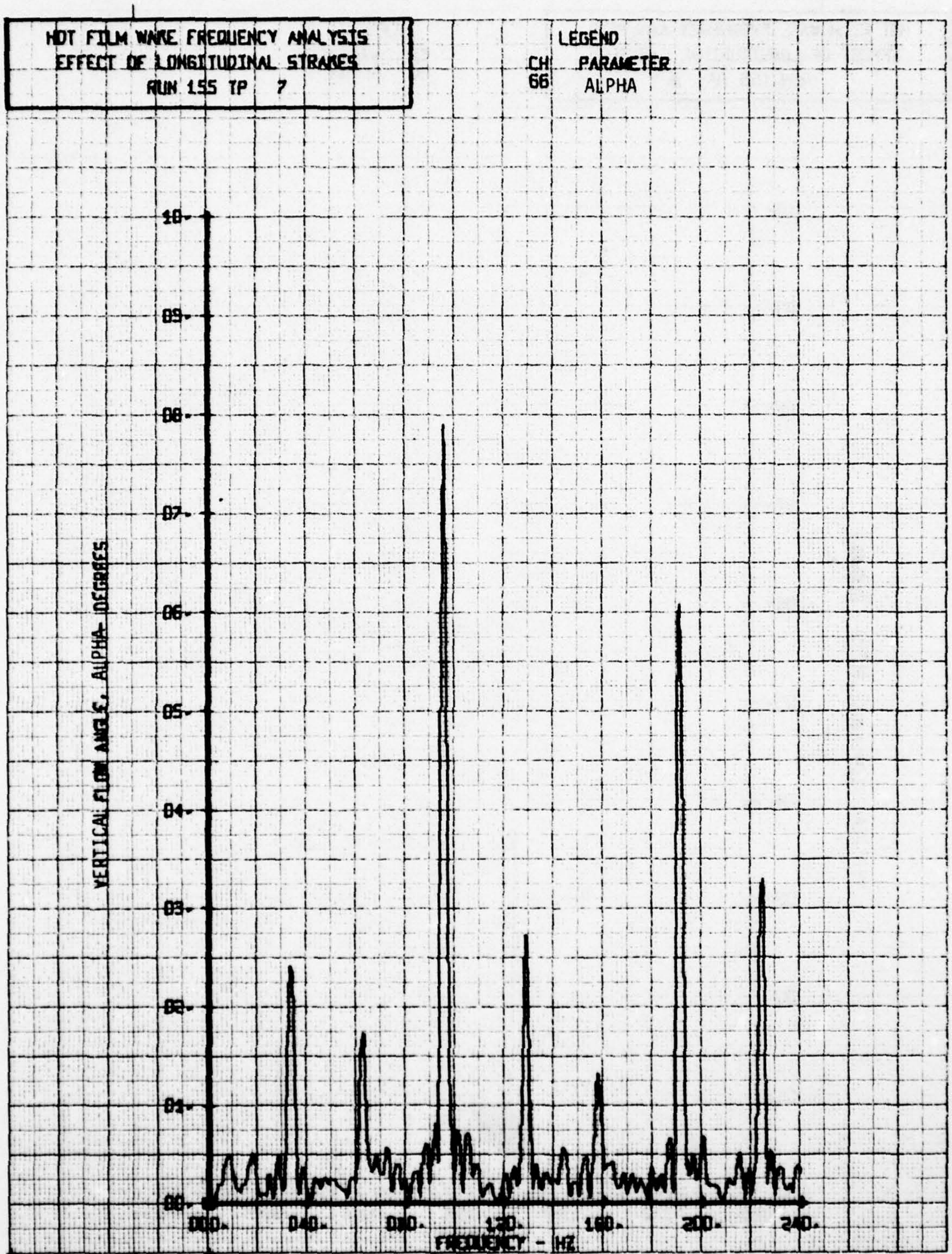
66 ALPHA
VERTICAL FLOW ANGLE, ALPHA- DEGREES
FREQUENCY - HZ



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EFFECT OF LONGITUDINAL STRAKES
RUN 155 TP 7
LEGEND
CH PARAMETER
66 ALPHA
VERTICAL FLOW ANGLE, ALPHA- DEGREES
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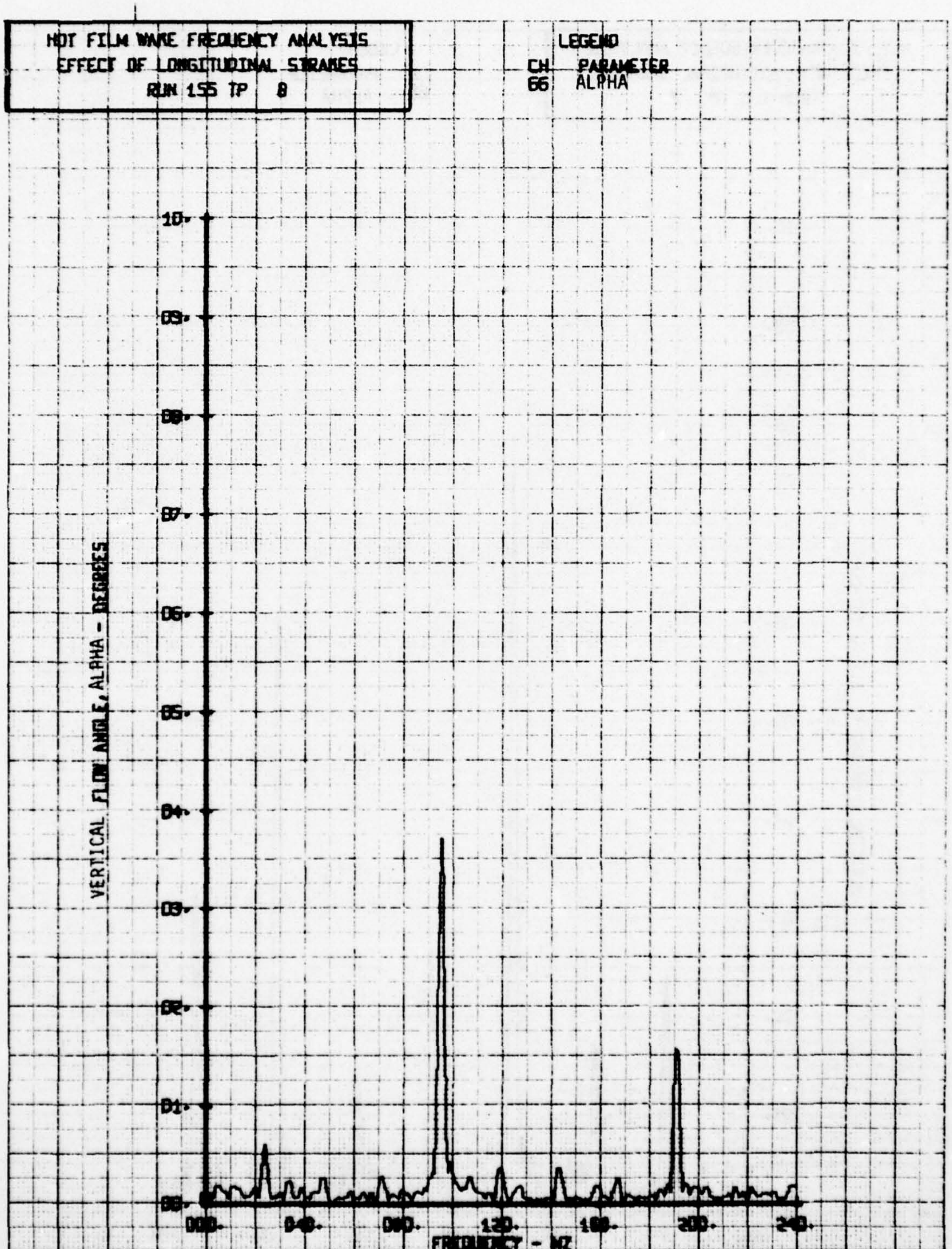
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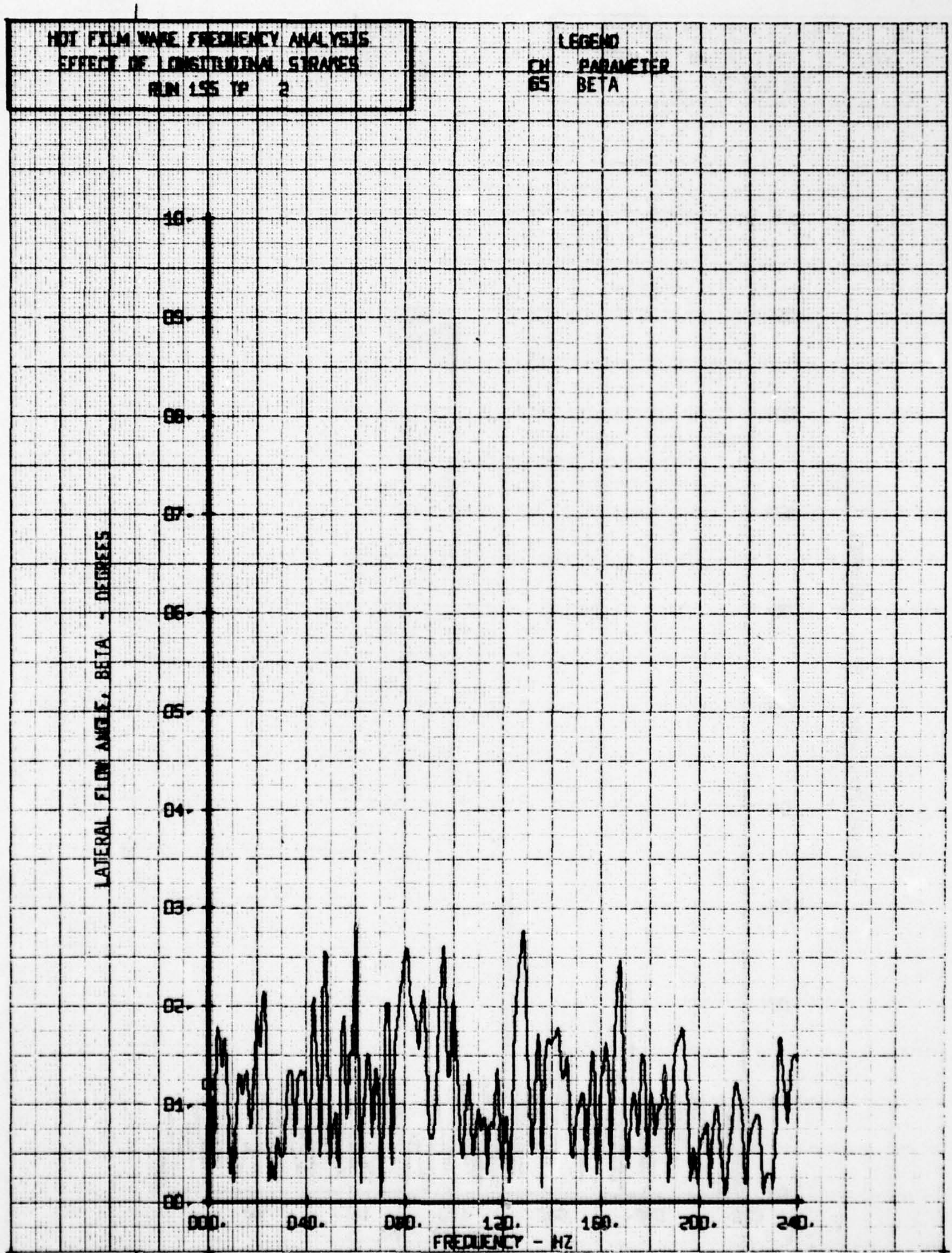
RUN 155 TP 8
LEGEND
CH PARAMETER
66 ALPHA
VERTICAL FLOW ANGLE, ALPHA - DEGREES
FREQUENCY - HZ



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EFFECT OF LONGITUDINAL STRAKES
RUN 155 TP 2
LEGEND
CH PARAMETER
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LATERAL FLOW ANGLE, BETA - DEGREES
FREQUENCY - HZ

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INTERACTIONAL AERODYNAMICS OF THE SINGLE ROTOR HELICOPTER CONFI--ETC(U)
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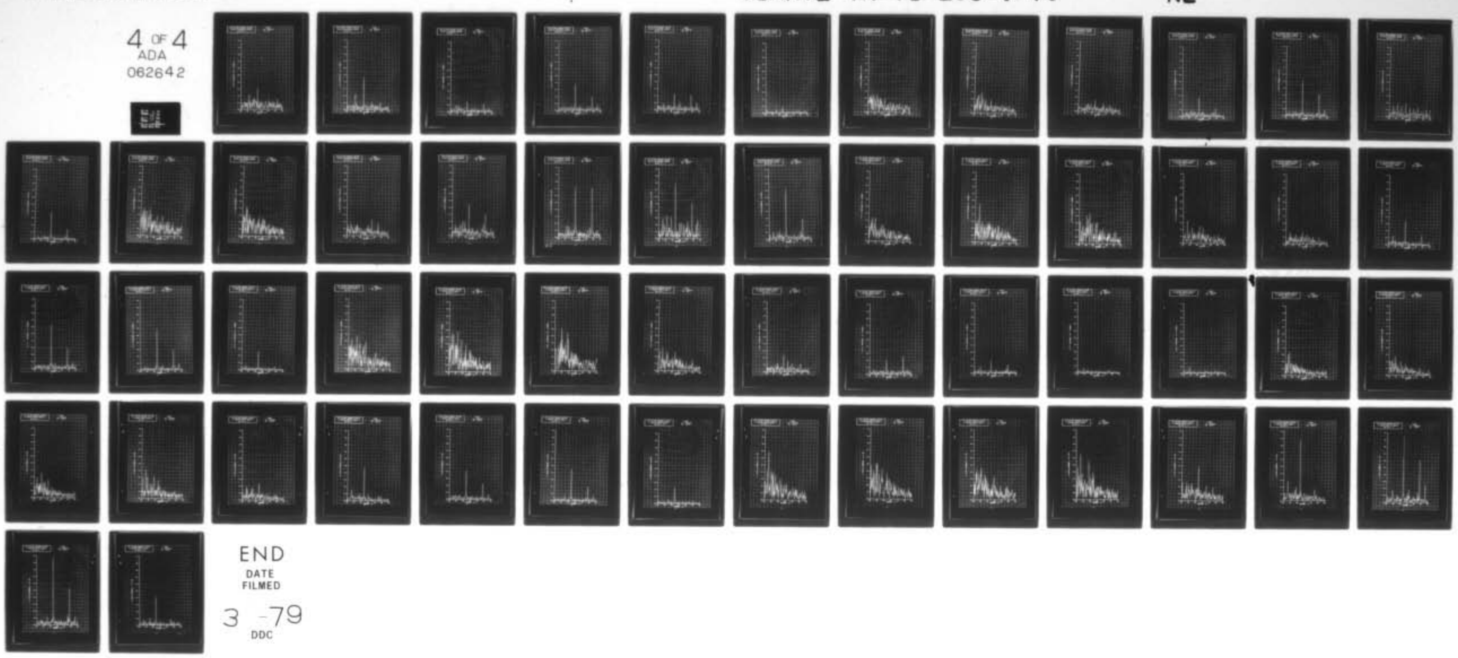

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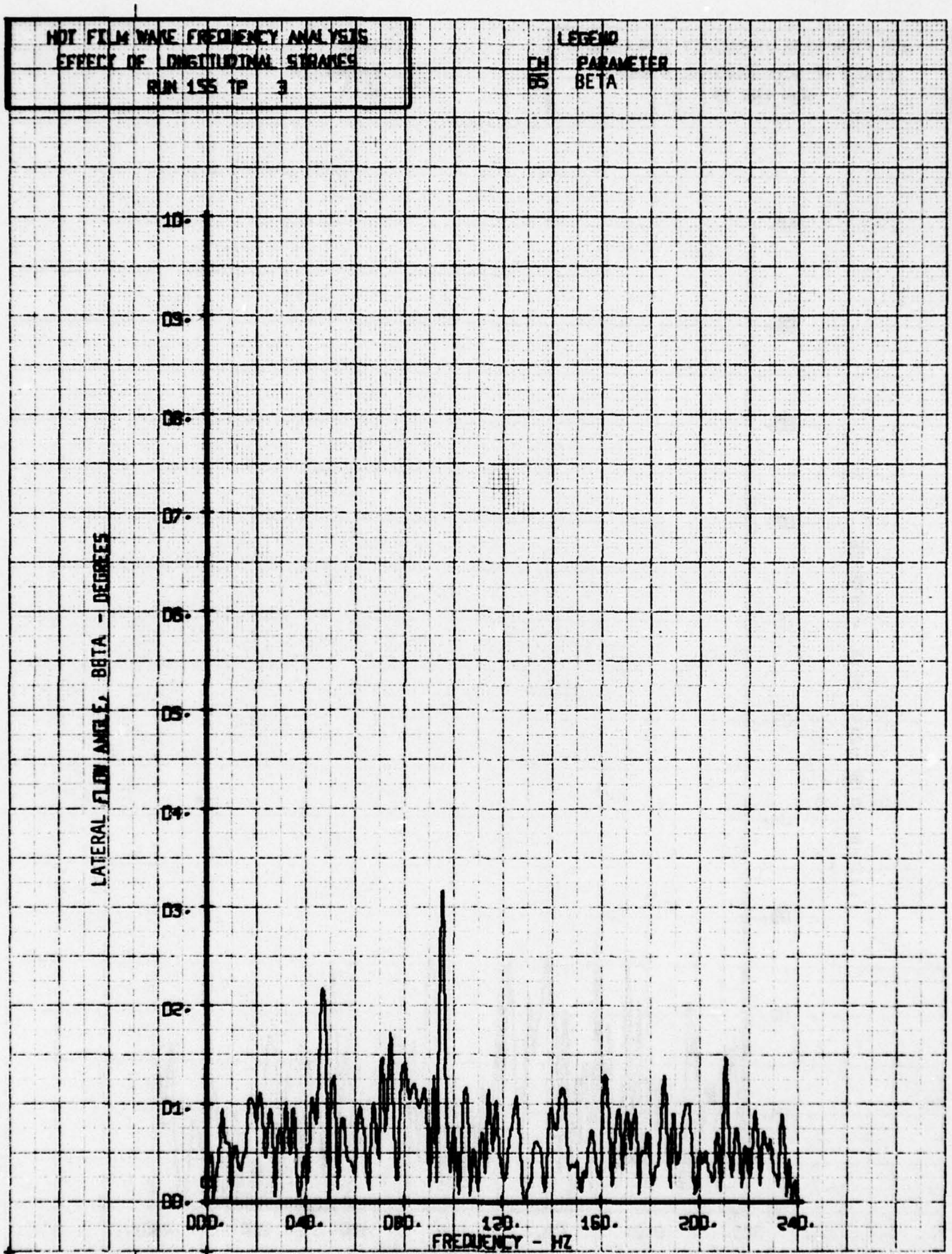
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EFFECT OF LONGITUDINAL STRAKES
RUN 155 TP 3
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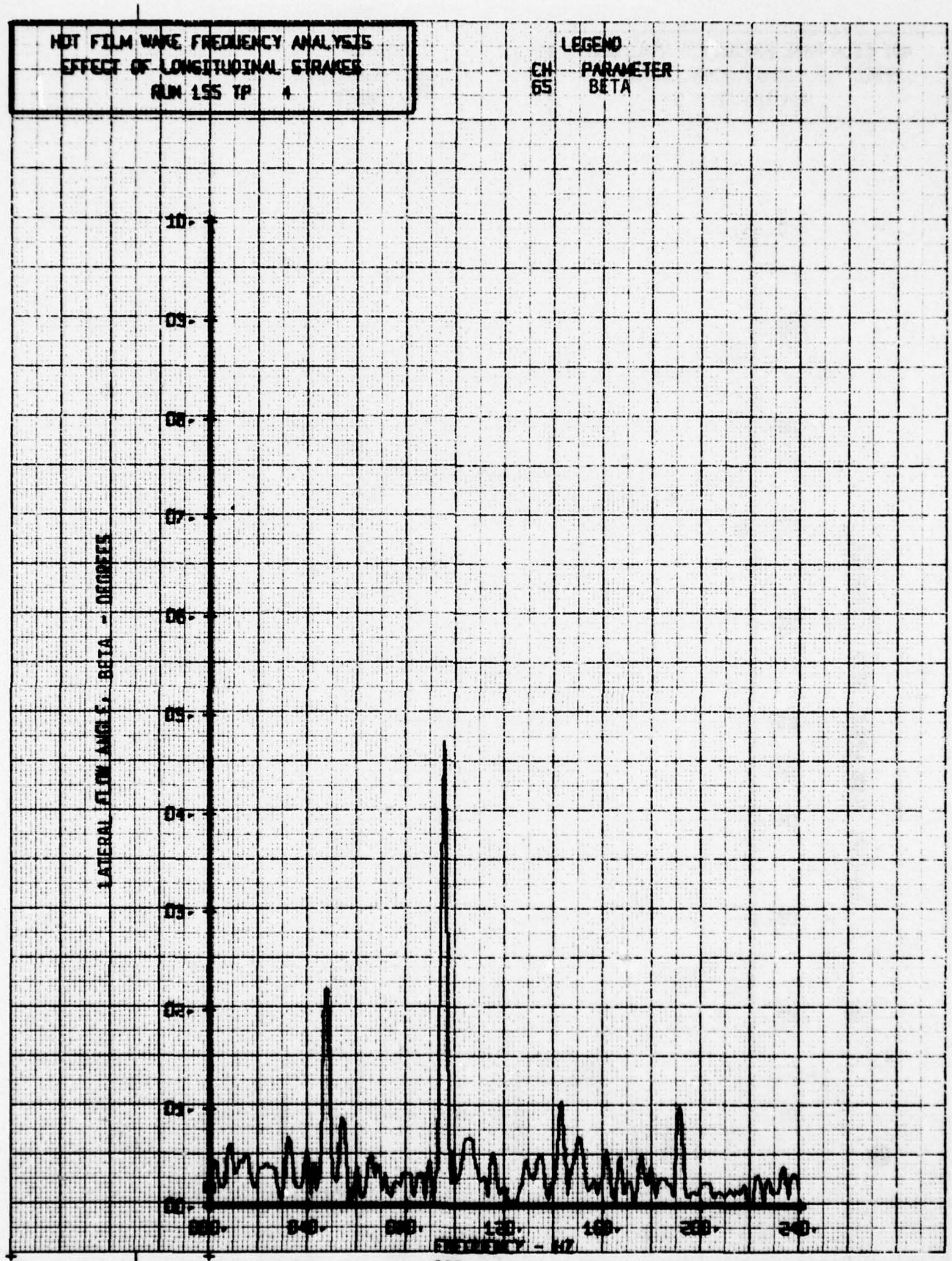
LATERAL FLOW ANGLE, BETA - DEGREES
FREQUENCY - HZ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EFFECT OF LONGITUDINAL STRAKES
RUN 155 TP 4
LEGEND
CH PARAMETER
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LATERAL FLOW ANGLE, BETA - DEGREES
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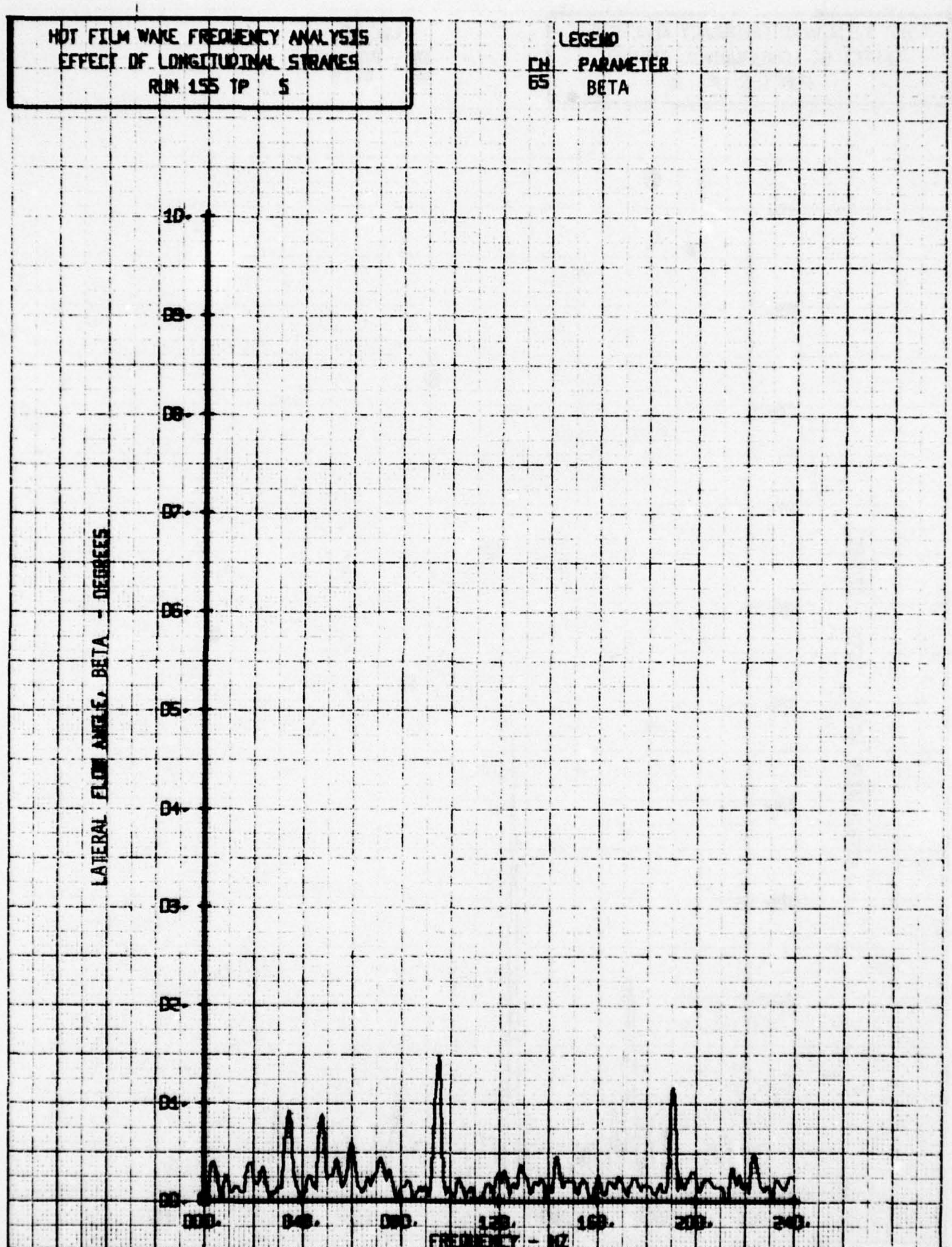
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LEGEND
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LATERAL FLOW ANGLE, BETA - DEGREES
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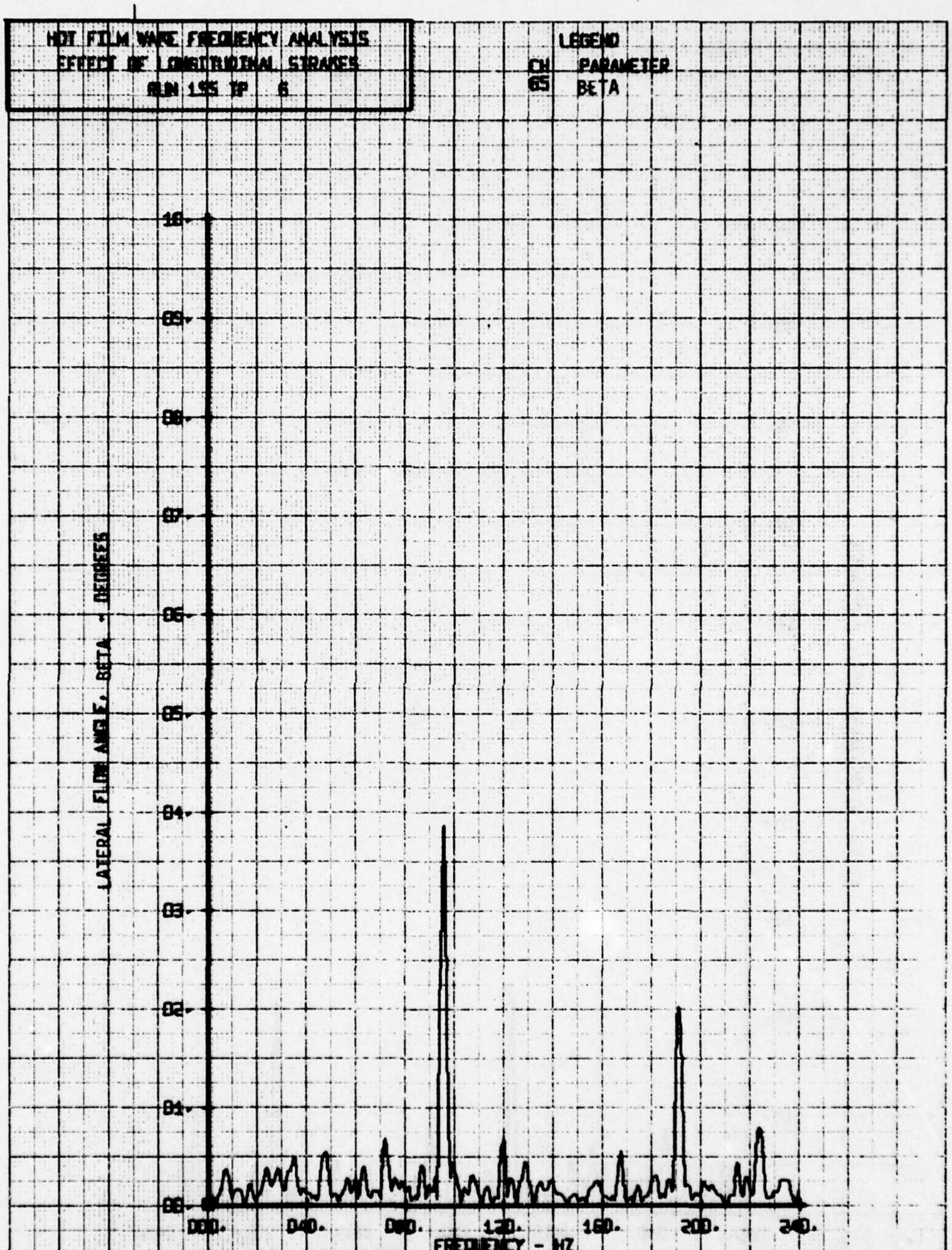
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LEGEND
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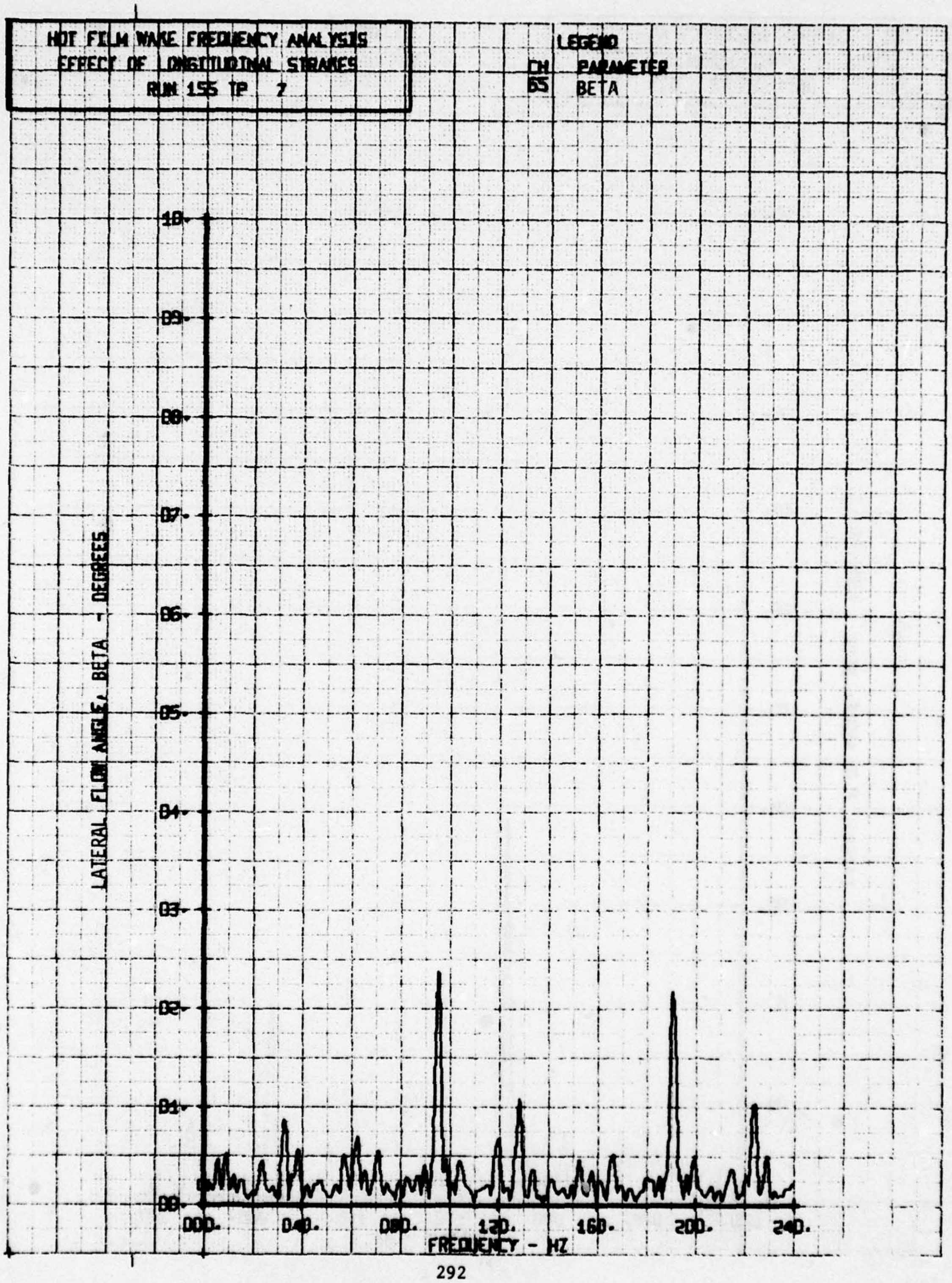
LATERAL FLOW ANGLE, BETA - DEGREES
FREQUENCY - HZ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LATERAL FLOW ANGLE, BETA - DEGREES
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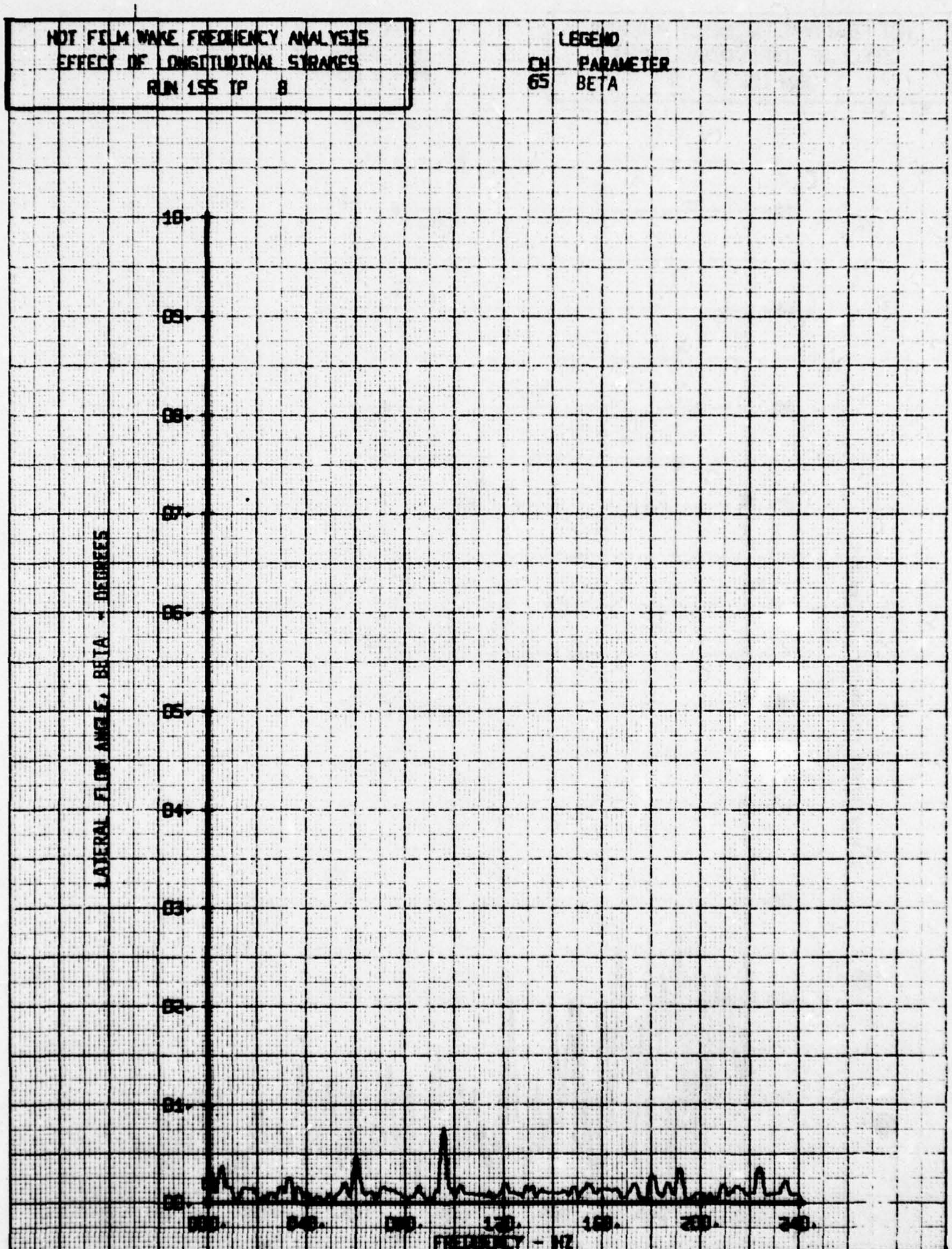
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RUN 155 TP 8
LEGEND
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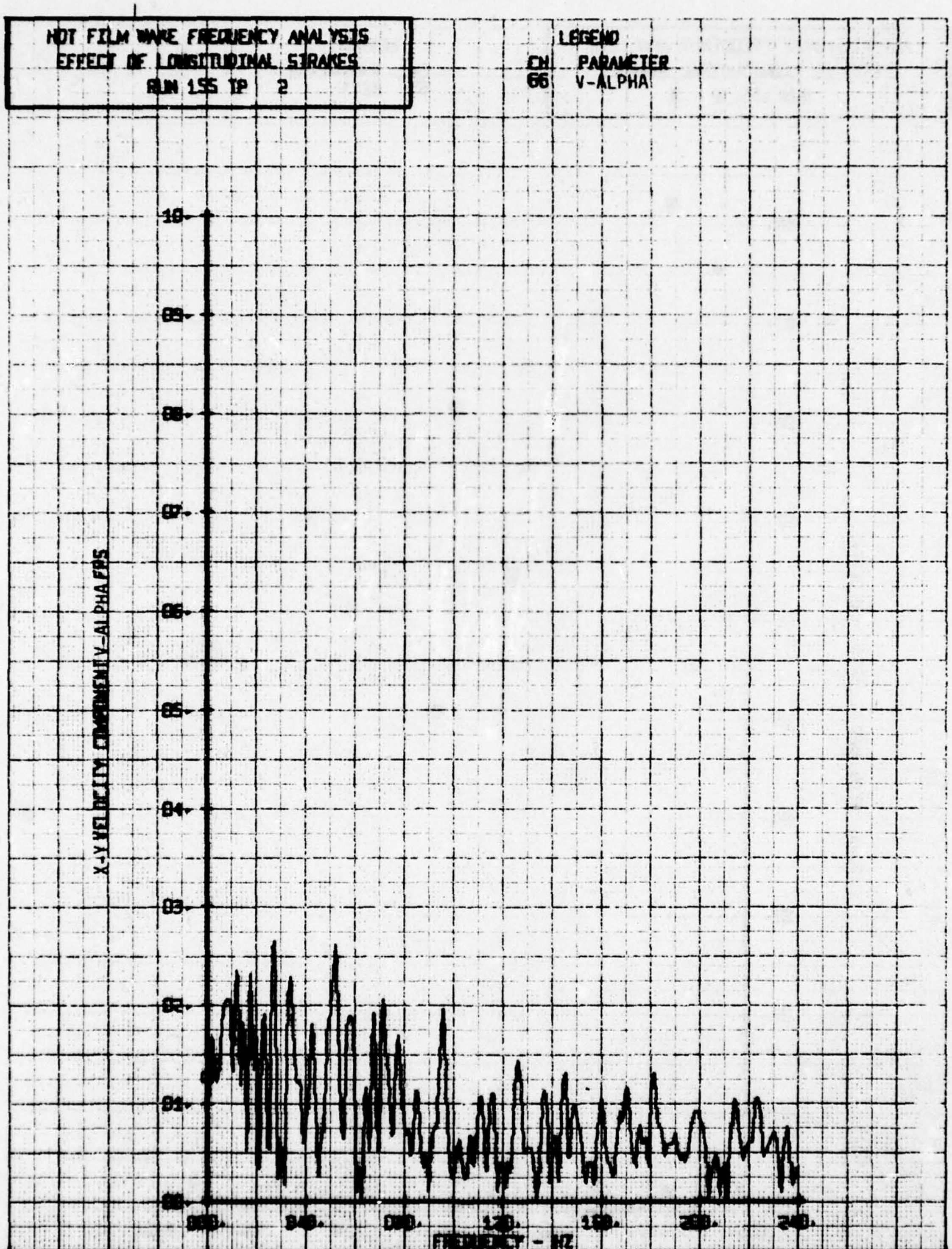
LATERAL FLOW ANGLE, BETA - DEGREES
FREQUENCY - HZ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EFFECT OF LONGITUDINAL STRAKES
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LEGEND
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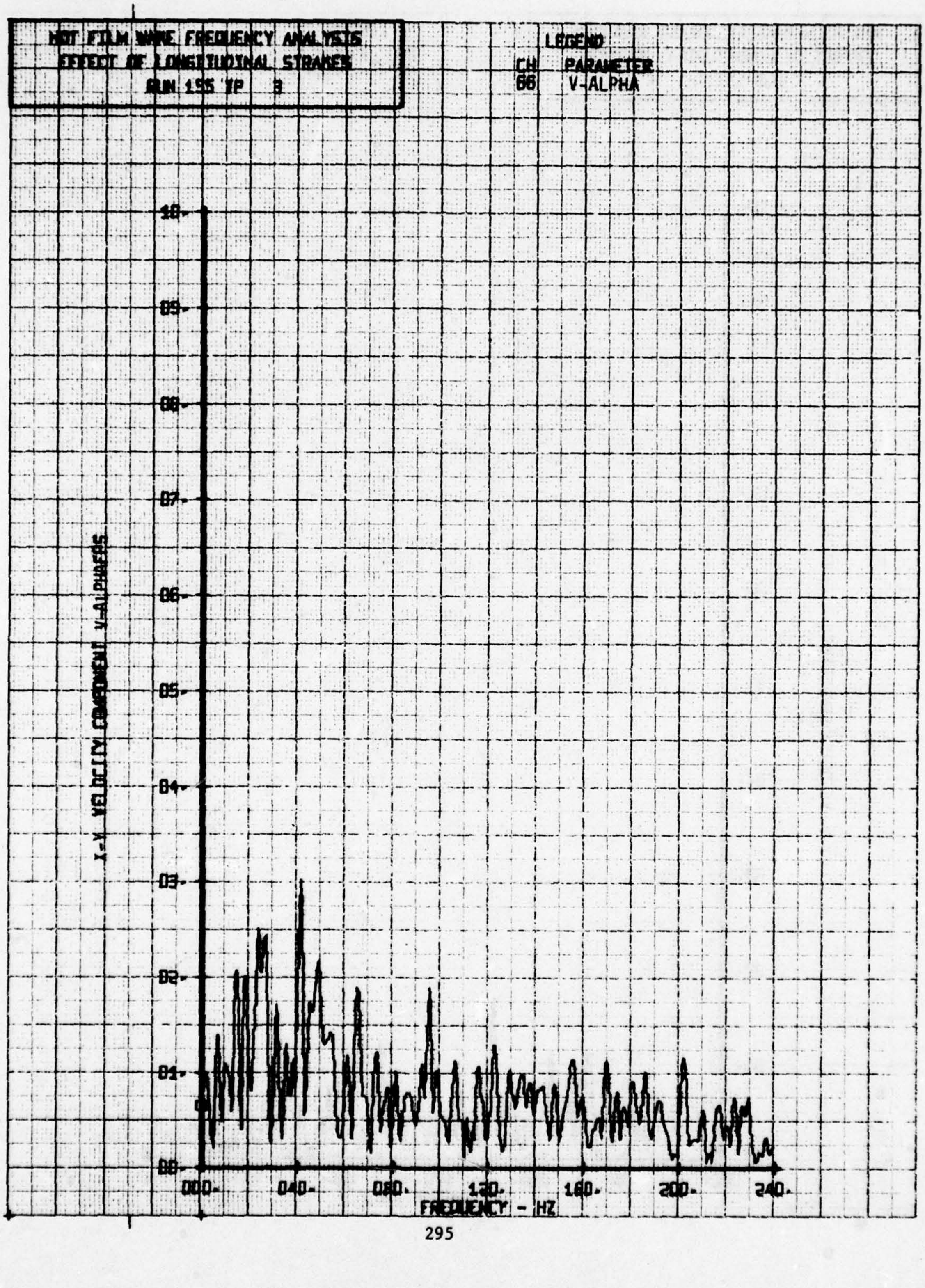
X-Y VELOCITY COMPONENT V-ALPHA FPS
FREQUENCY - HZ



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EFFECT OF LONGITUDINAL STRAKES
RUN 155 TP 3
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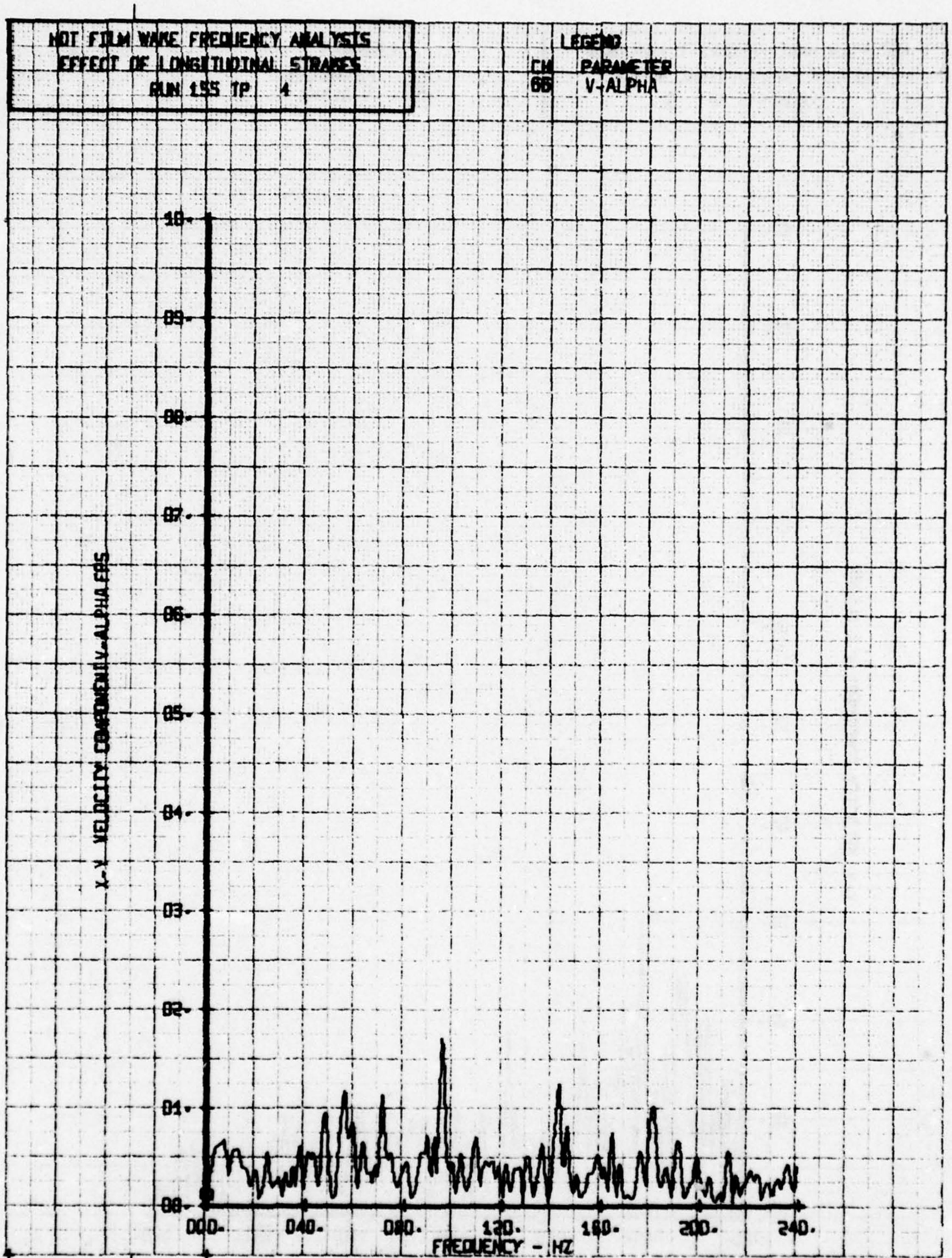
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EFFECT OF LONGITUDINAL STRAKES
RUN 155 TP 4
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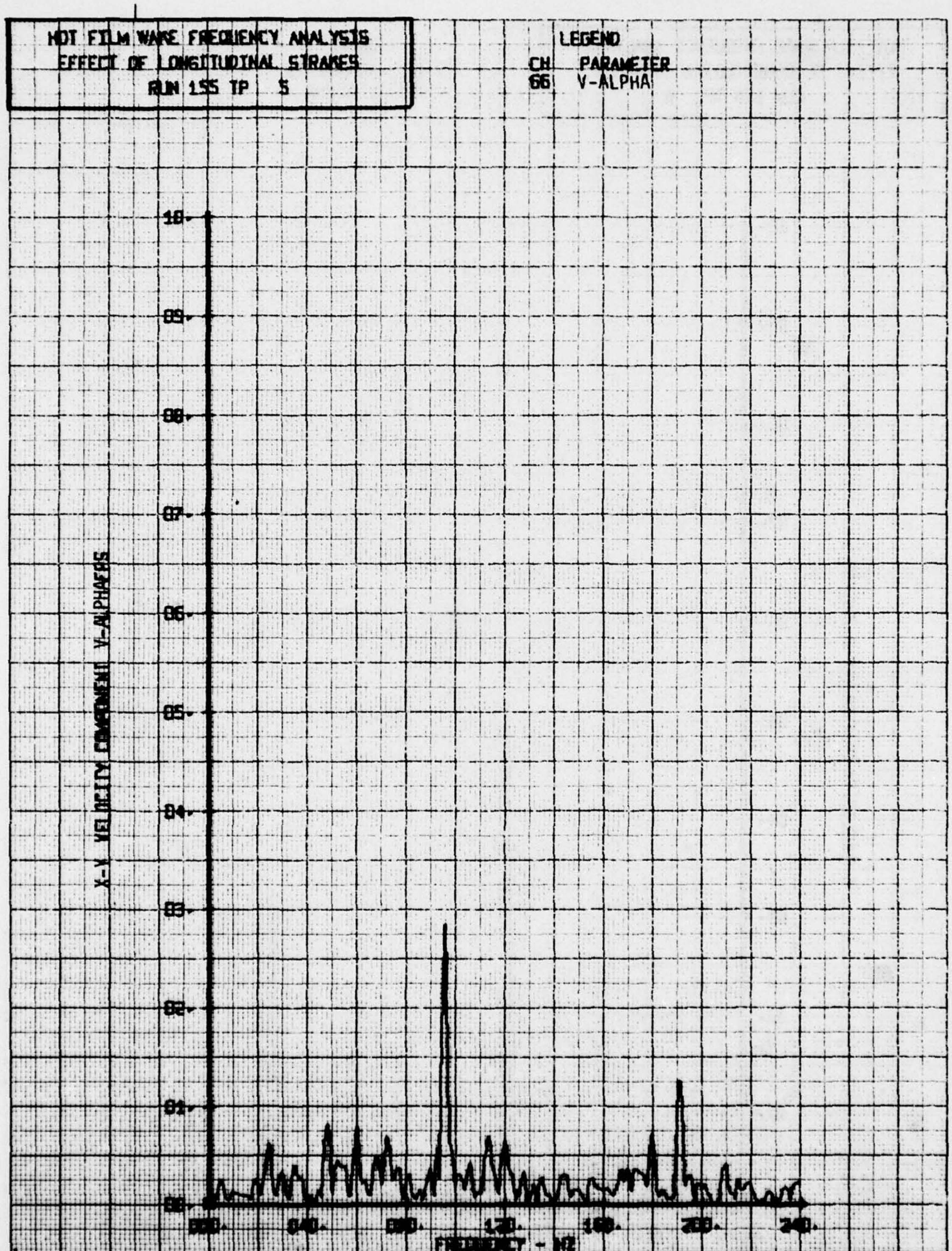
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EFFECT OF LONGITUDINAL STRAKES
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LEGEND
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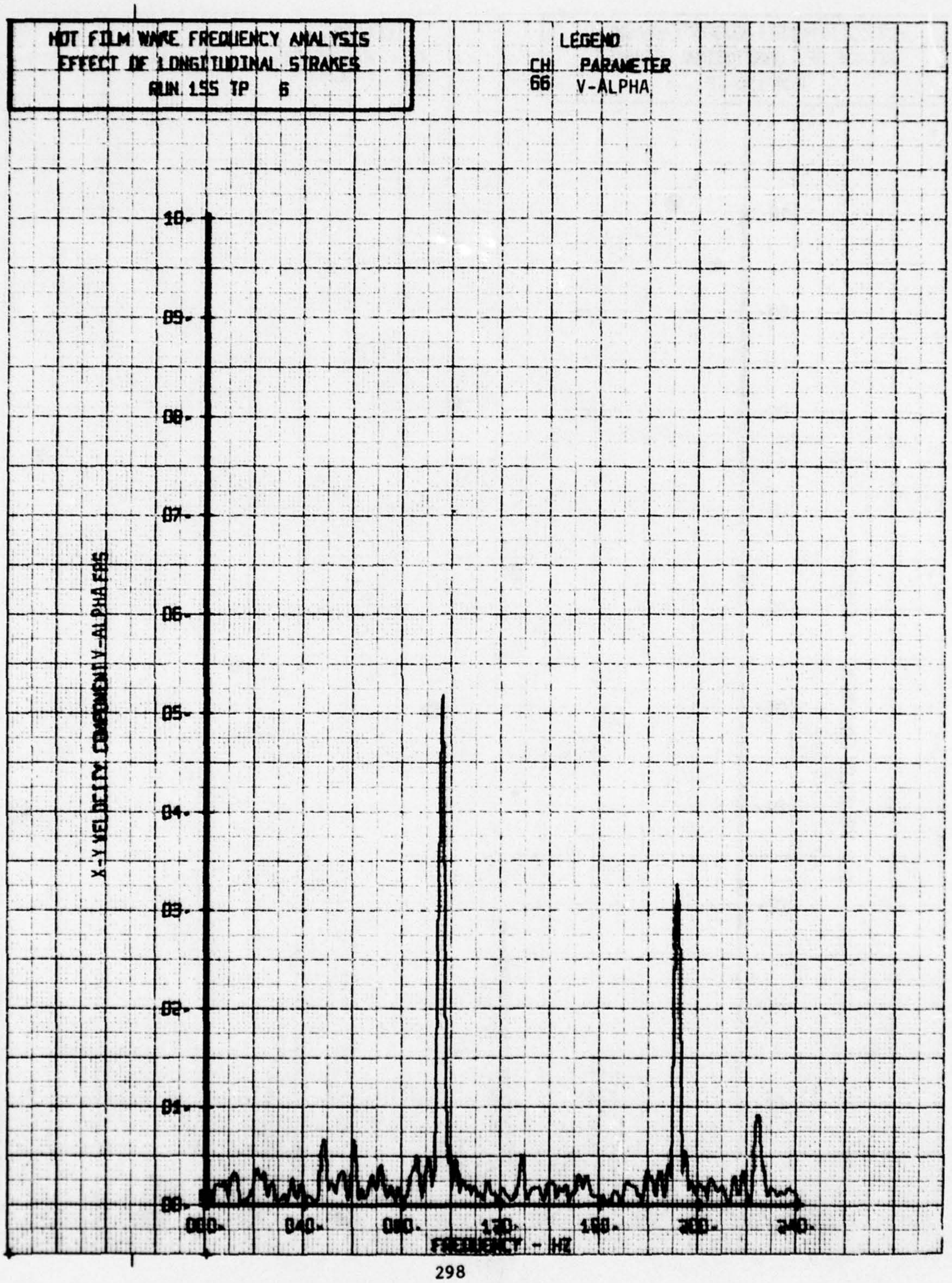
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EFFECT OF LONGITUDINAL STRAKES
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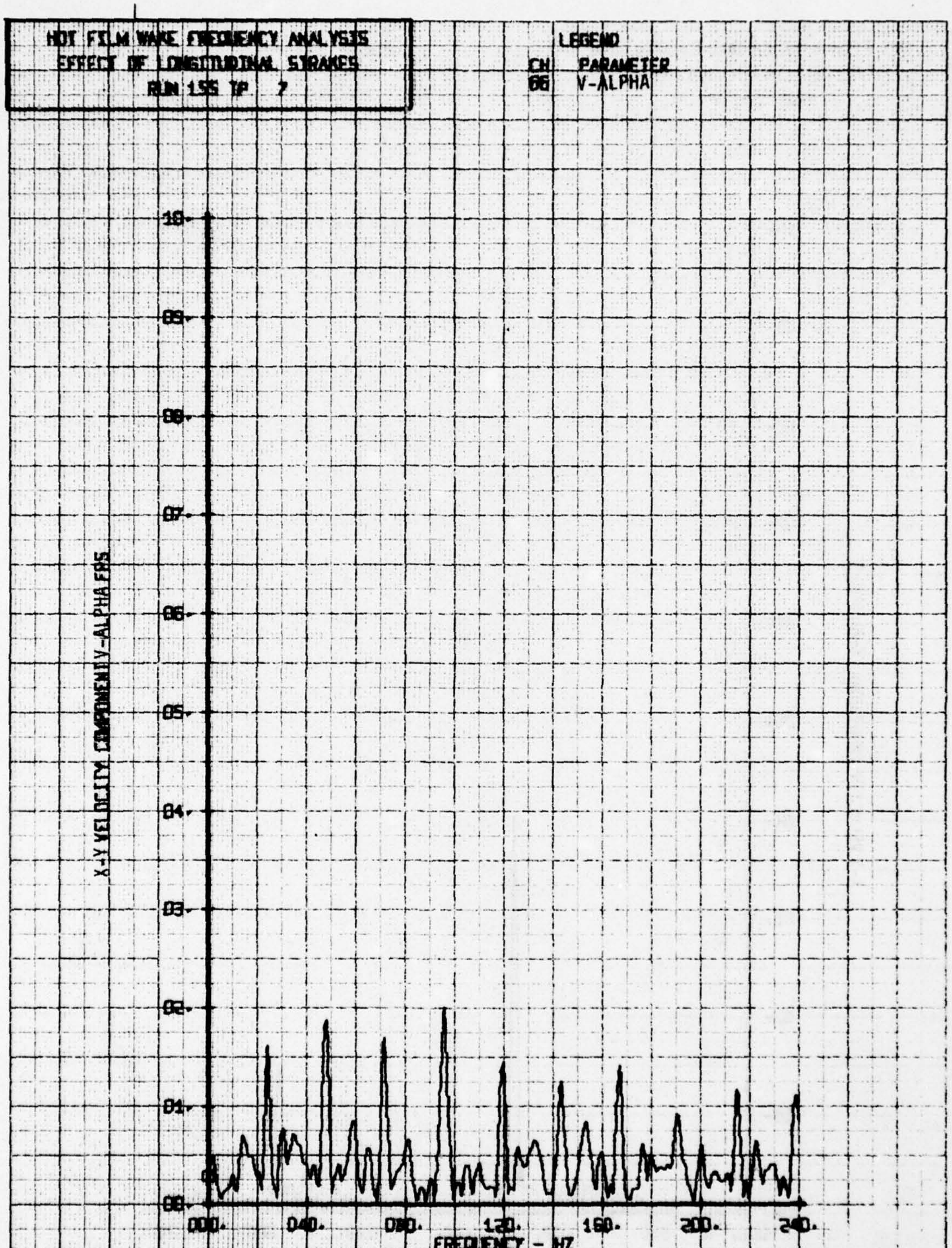
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EFFECT OF LONGITUDINAL STRAKES
RUN 155 TP 7
LEGEND
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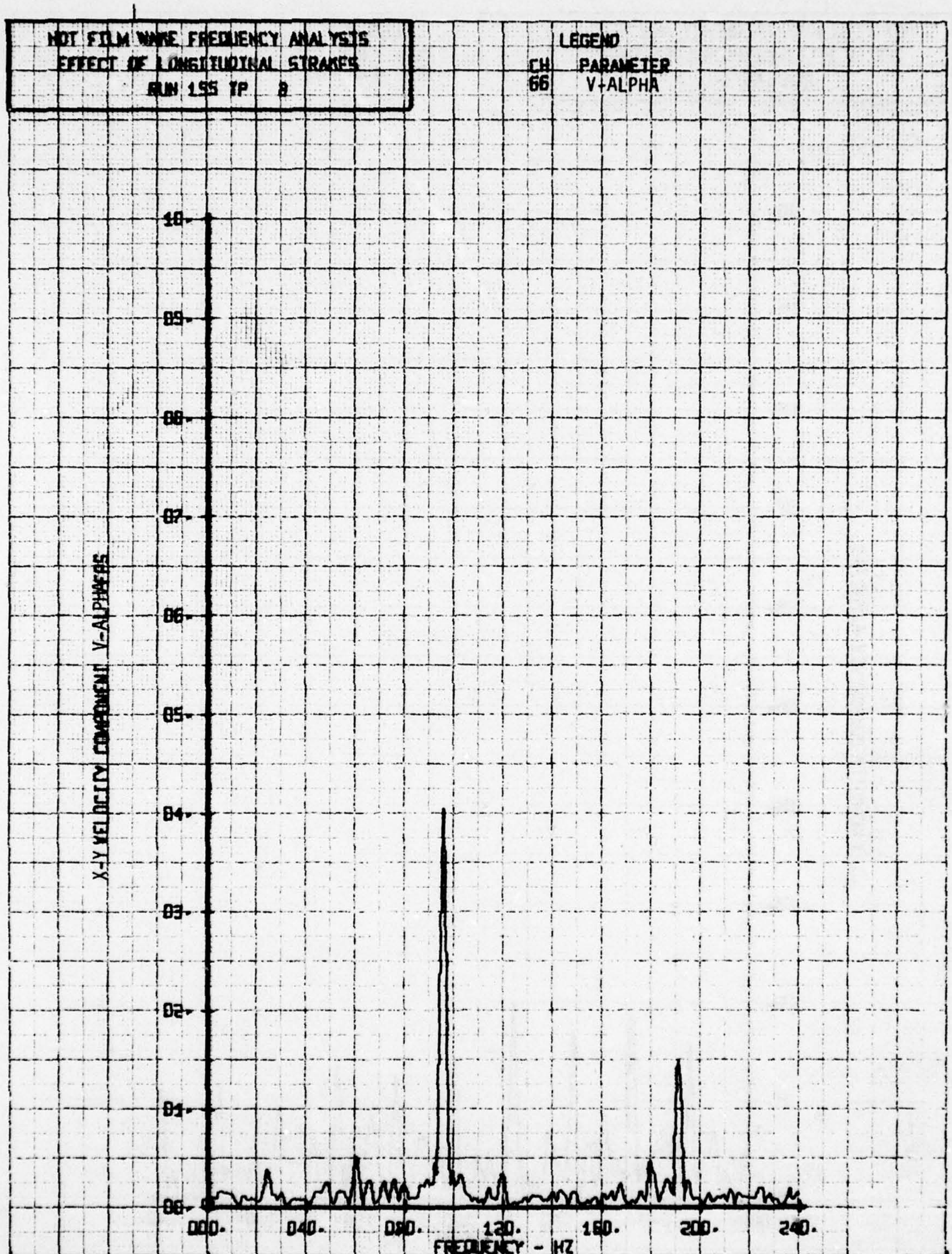

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EFFECT OF LONGITUDINAL STRAKES
RUN 155 TP 8
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X-Y VELOCITY COMPONENT V-ALPHA
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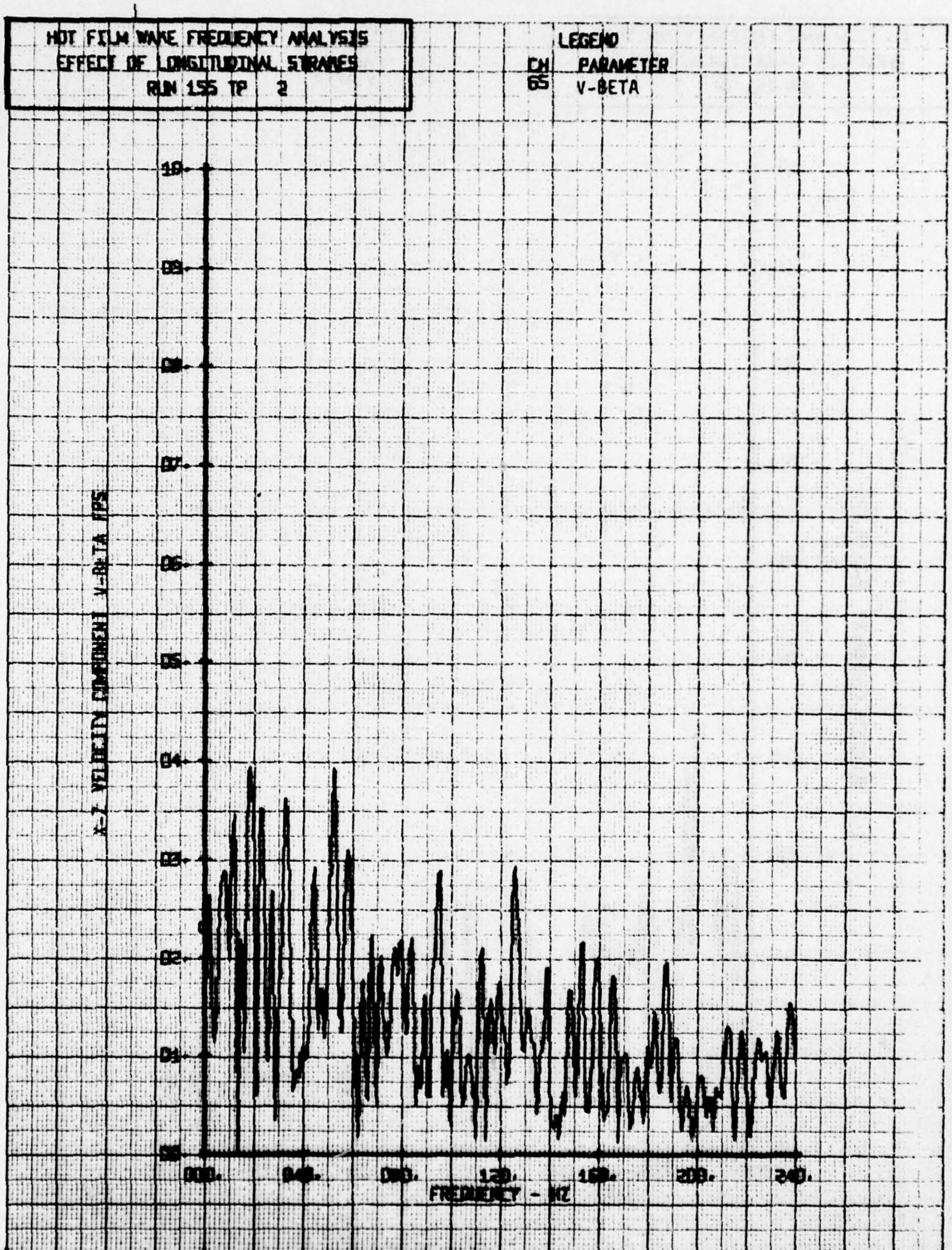
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EFFECT OF LONGITUDINAL STRAKES
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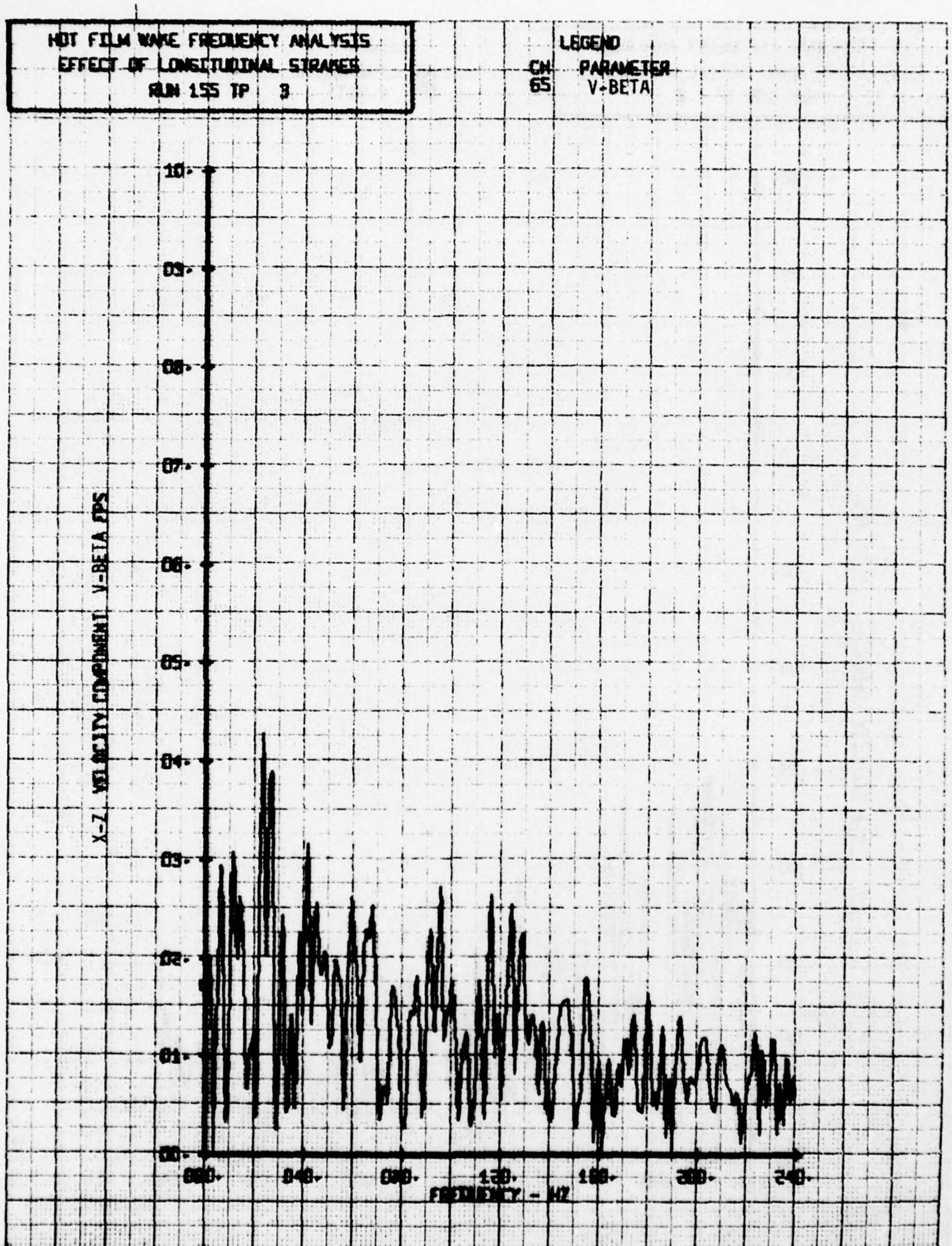
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EFFECT OF LONGITUDINAL STRAKES
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LEGEND
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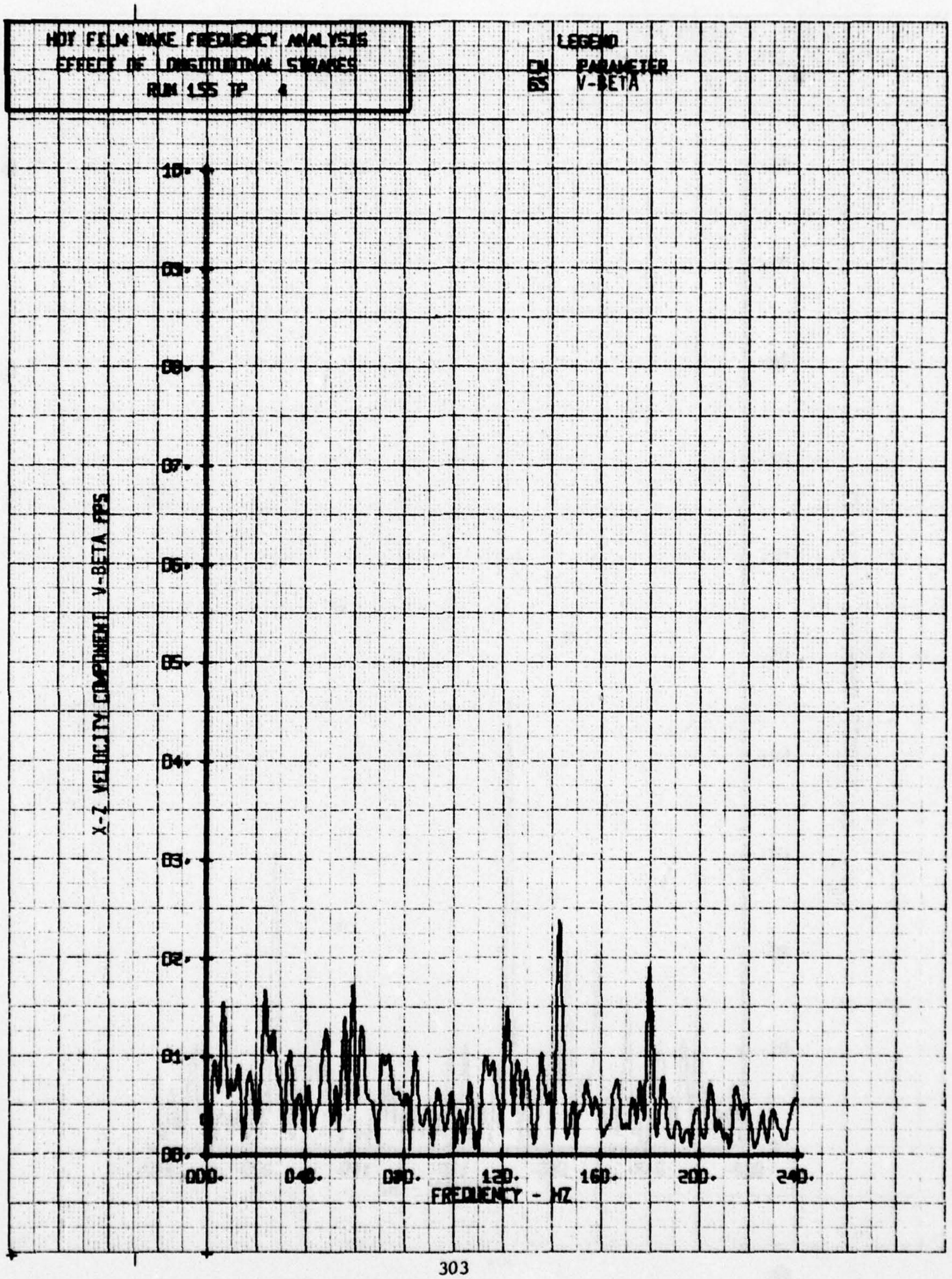

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EFFECT OF LONGITUDINAL STRAKES
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LEGEND
CN PARAMETER
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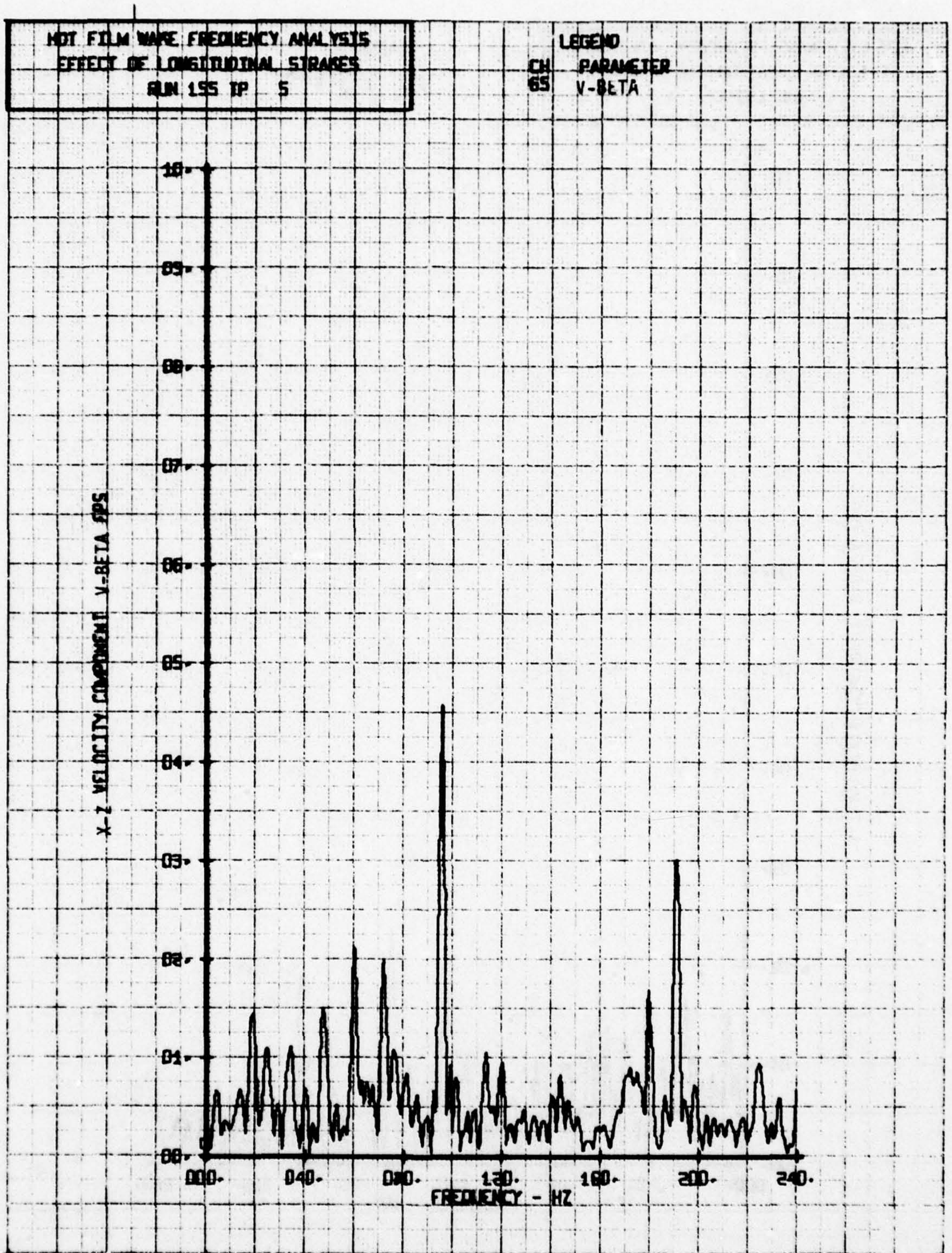
FREQUENCY - HZ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LEGEND
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X-Z VELOCITY COMPONENT V-BETA FPS
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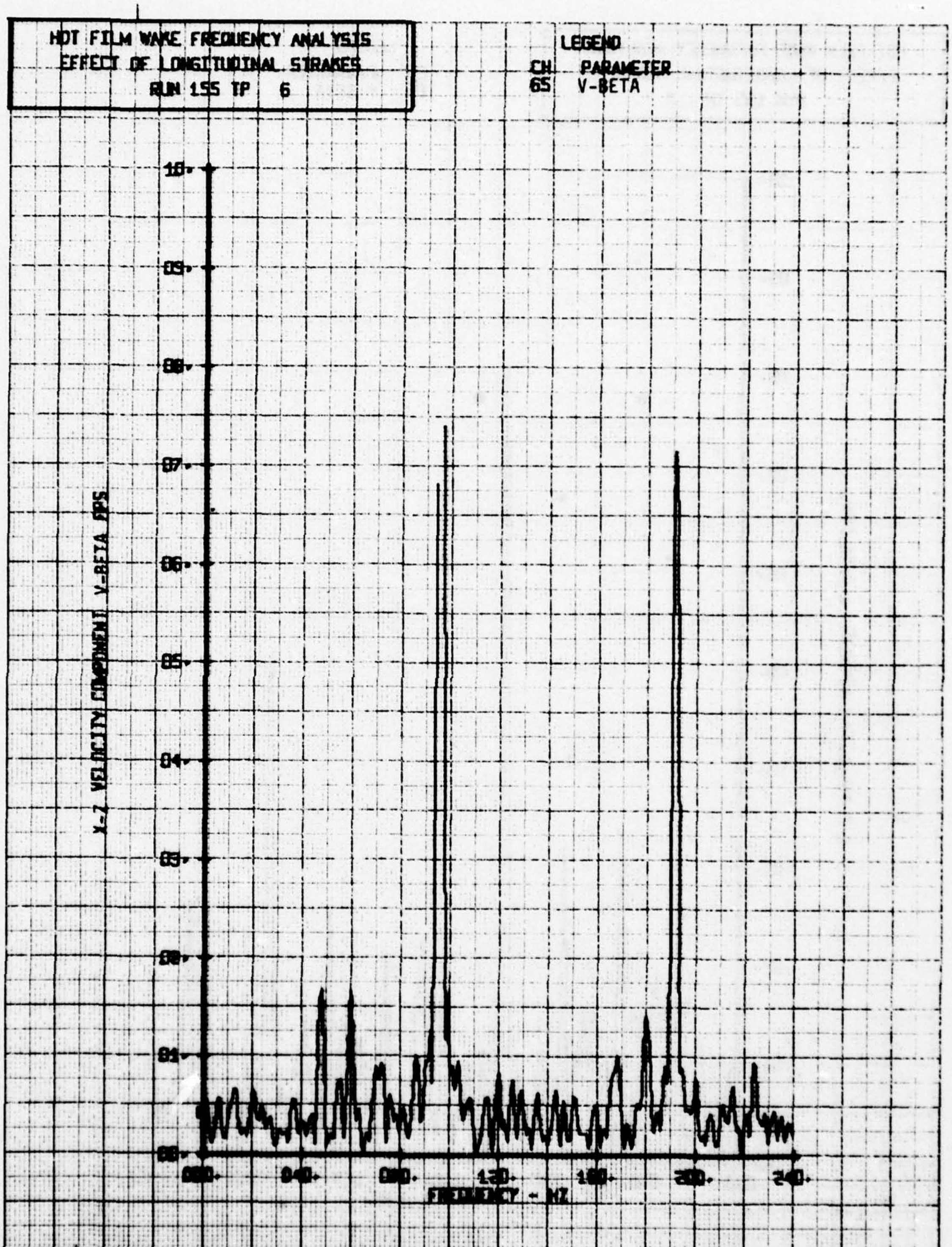

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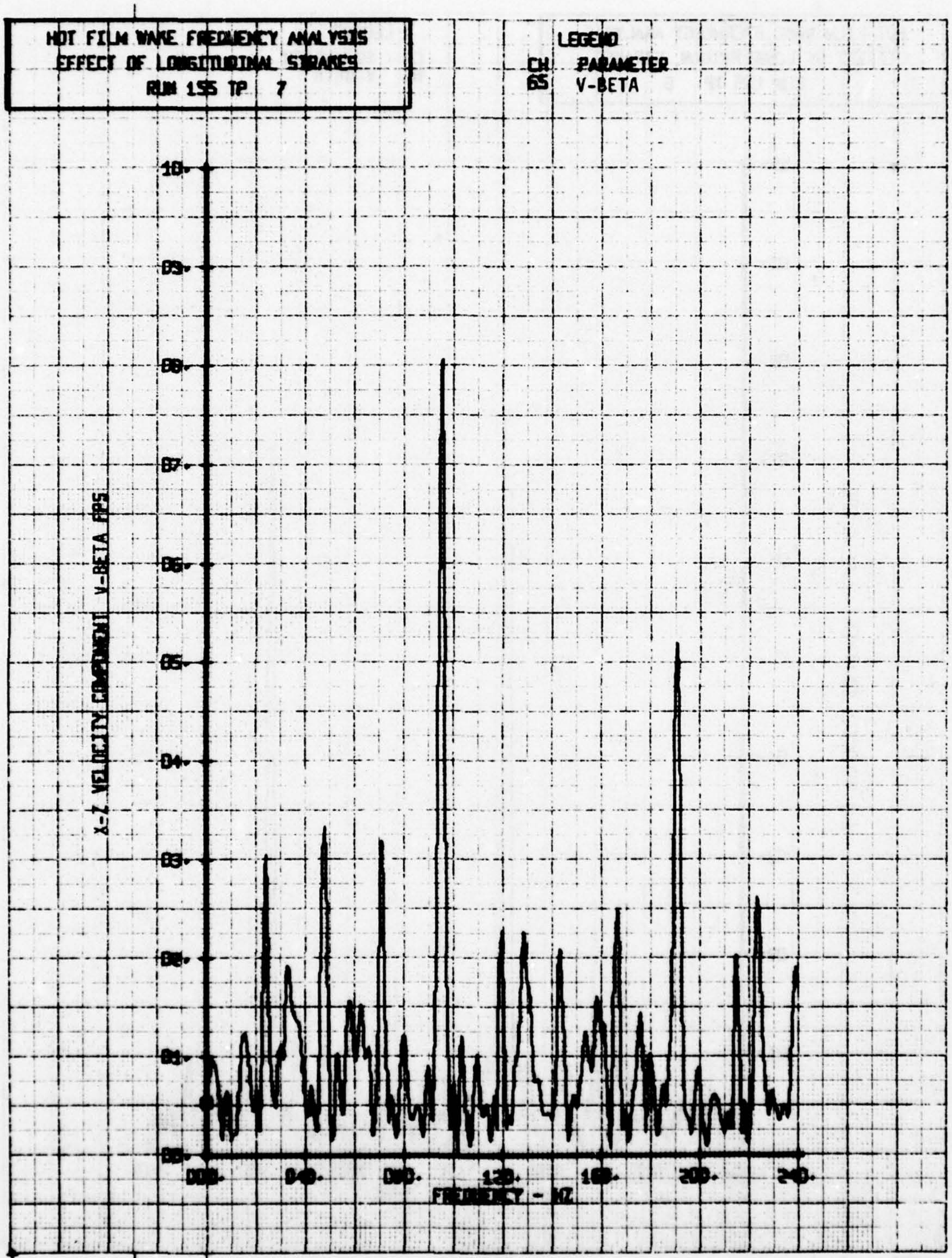
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EFFECT OF LONGITUDINAL STRAKES
RUN 155 TP 7
LEGEND
CH PARAMETER
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X-Z VELOCITY COMPONENT V-BETA FPS
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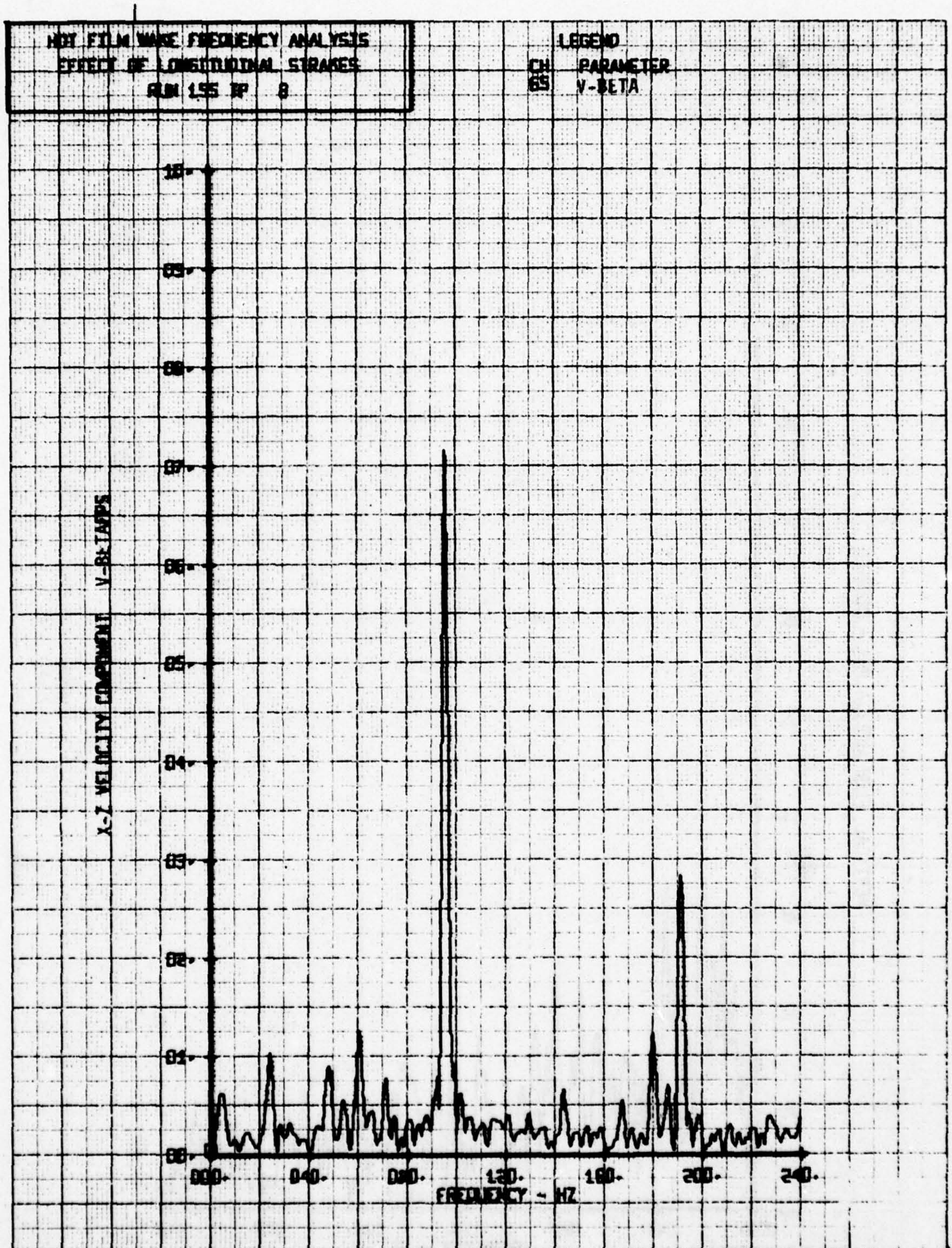

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EFFECT OF LONGITUDINAL STRAKES
RUN 155 TP 8
LEGEND
CH PARAMETER
65 V-BETA
X-Z VELOCITY COMPONENT V-BETAPS
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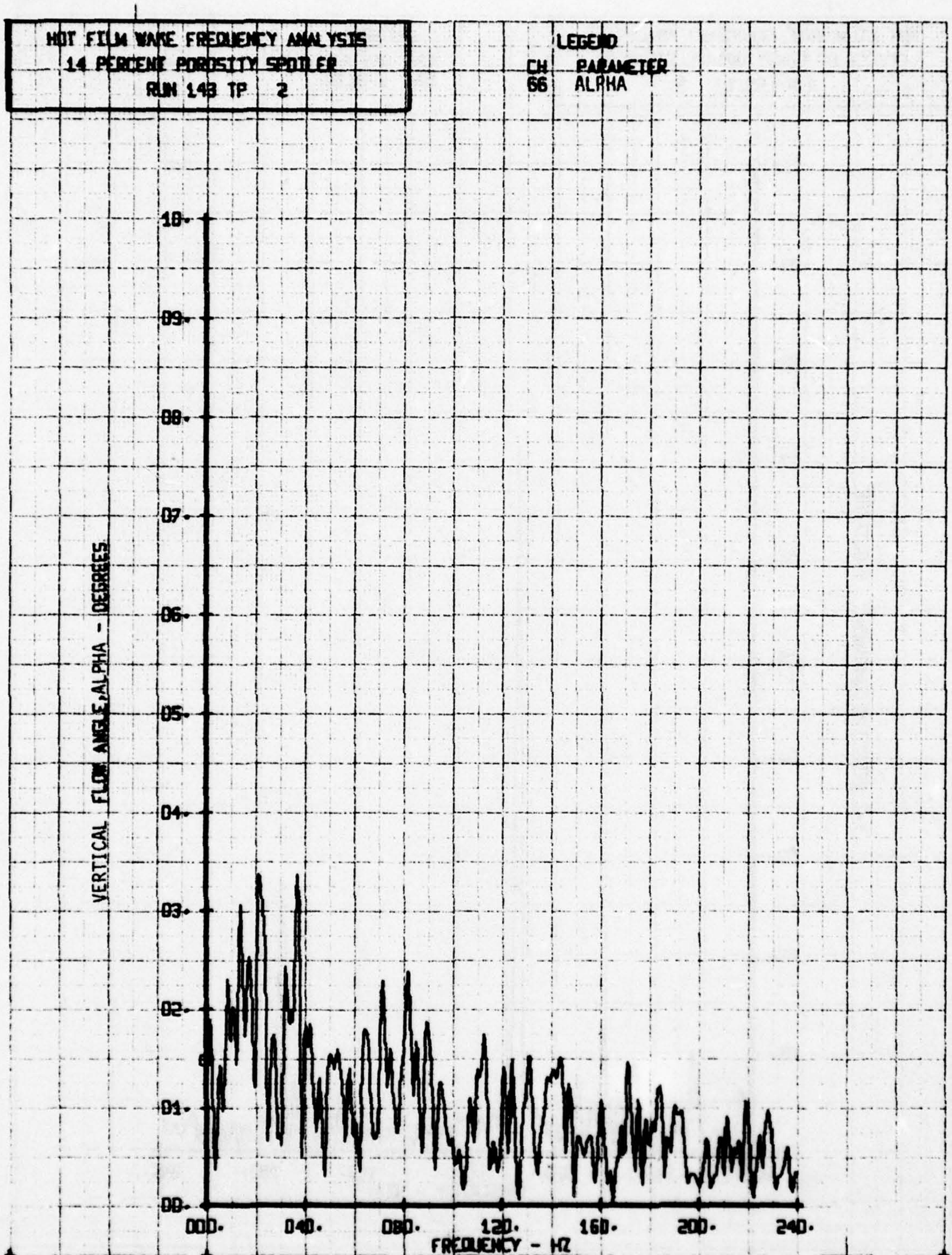
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14 PERCENT POROSITY SPOILER
RUN 143 TP 2
LEGEND
CH PARAMETER
66 ALPHA
VERTICAL FLOW ANGLE,ALPHA - DEGREES
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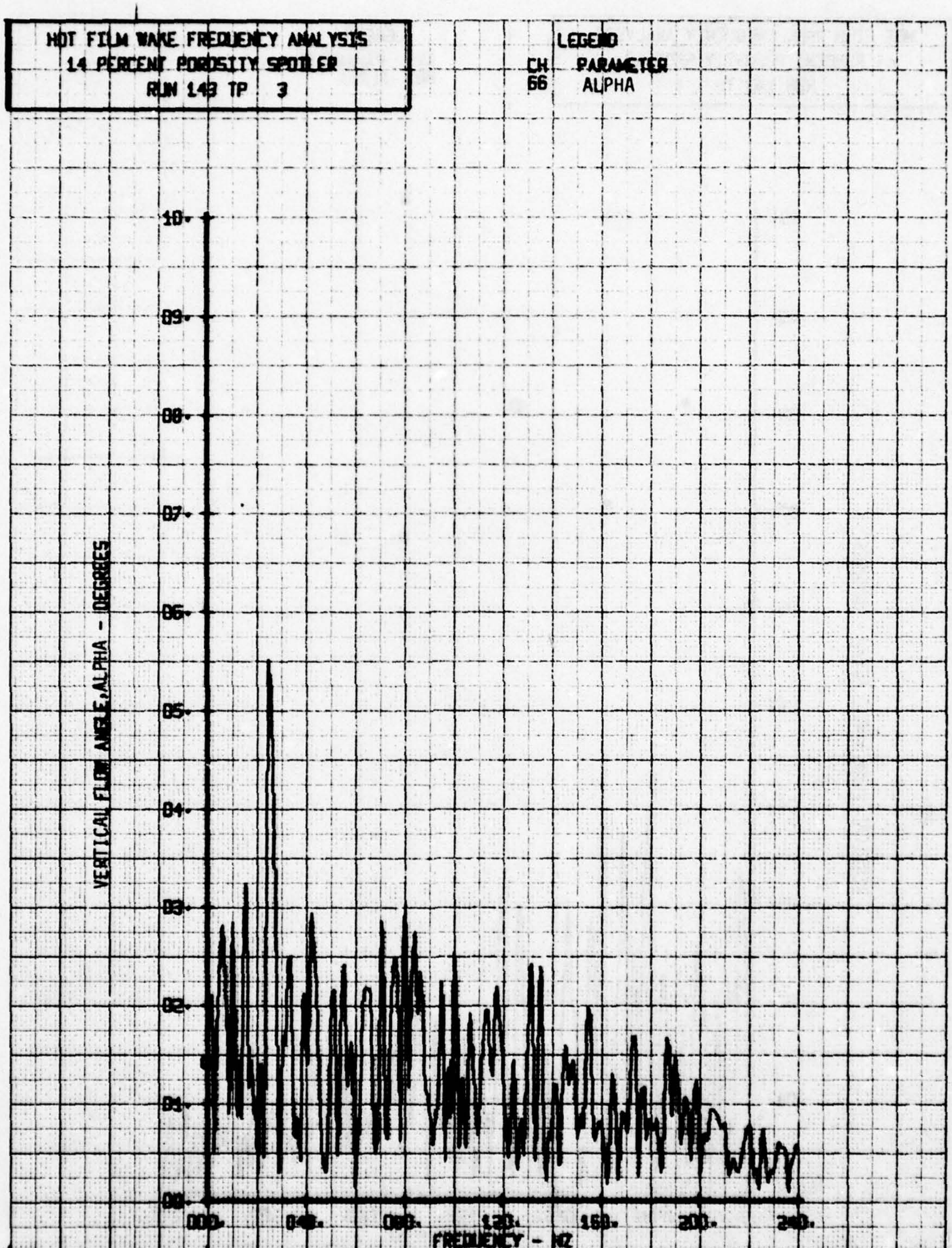
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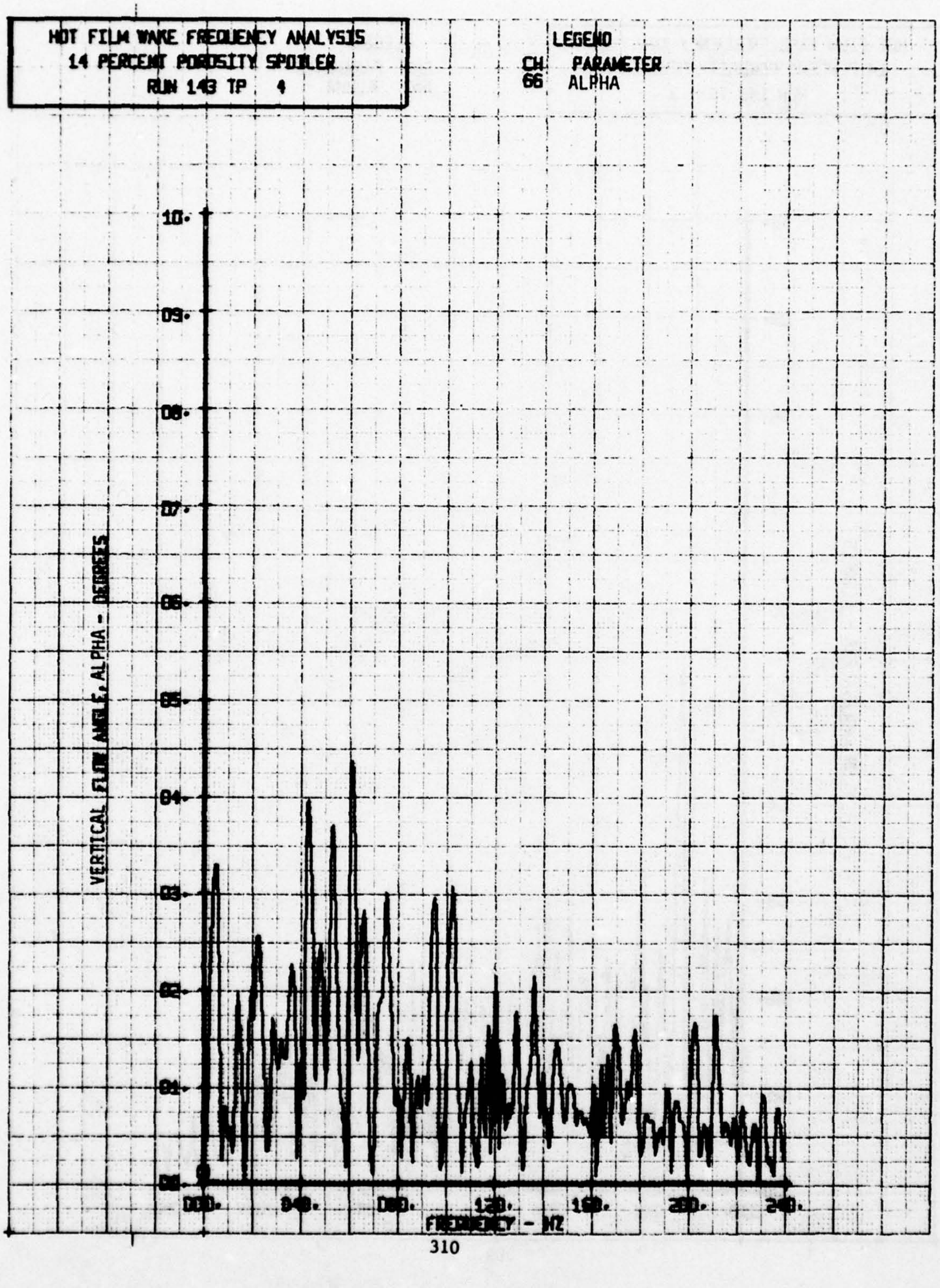
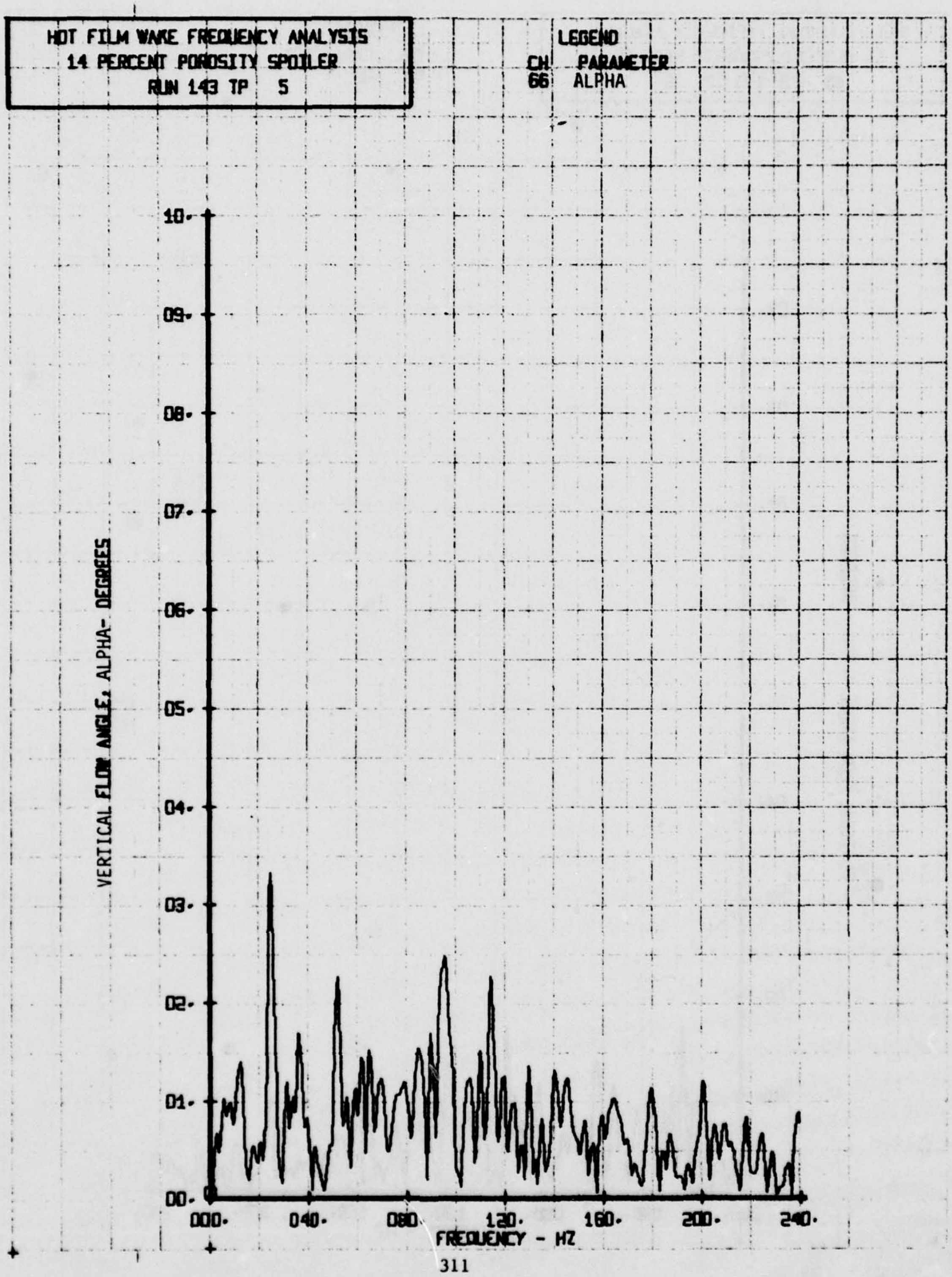
RUN 143 TP 3
LEGEND
CH PARAMETER
66 ALPHA
VERTICAL FLOW ANGLE,ALPHA - DEGREES
FREQUENCY - HZ


HOT FILM WAKE FREQUENCY ANALYSIS
14 PERCENT POROSITY SPOILER
RUN 143 TP 4
LEGEND
CH PARAMETER
66 ALPHA
VERTICAL FLOW ANGLE, ALPHA - DEGREES
FREQUENCY - HZ


HOT FILM WAKE FREQUENCY ANALYSIS
14 PERCENT POROSITY SPOILER
RUN 143 TP 5
LEGEND
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66 ALPHA
VERTICAL FLOW ANGLE, ALPHA- DEGREES
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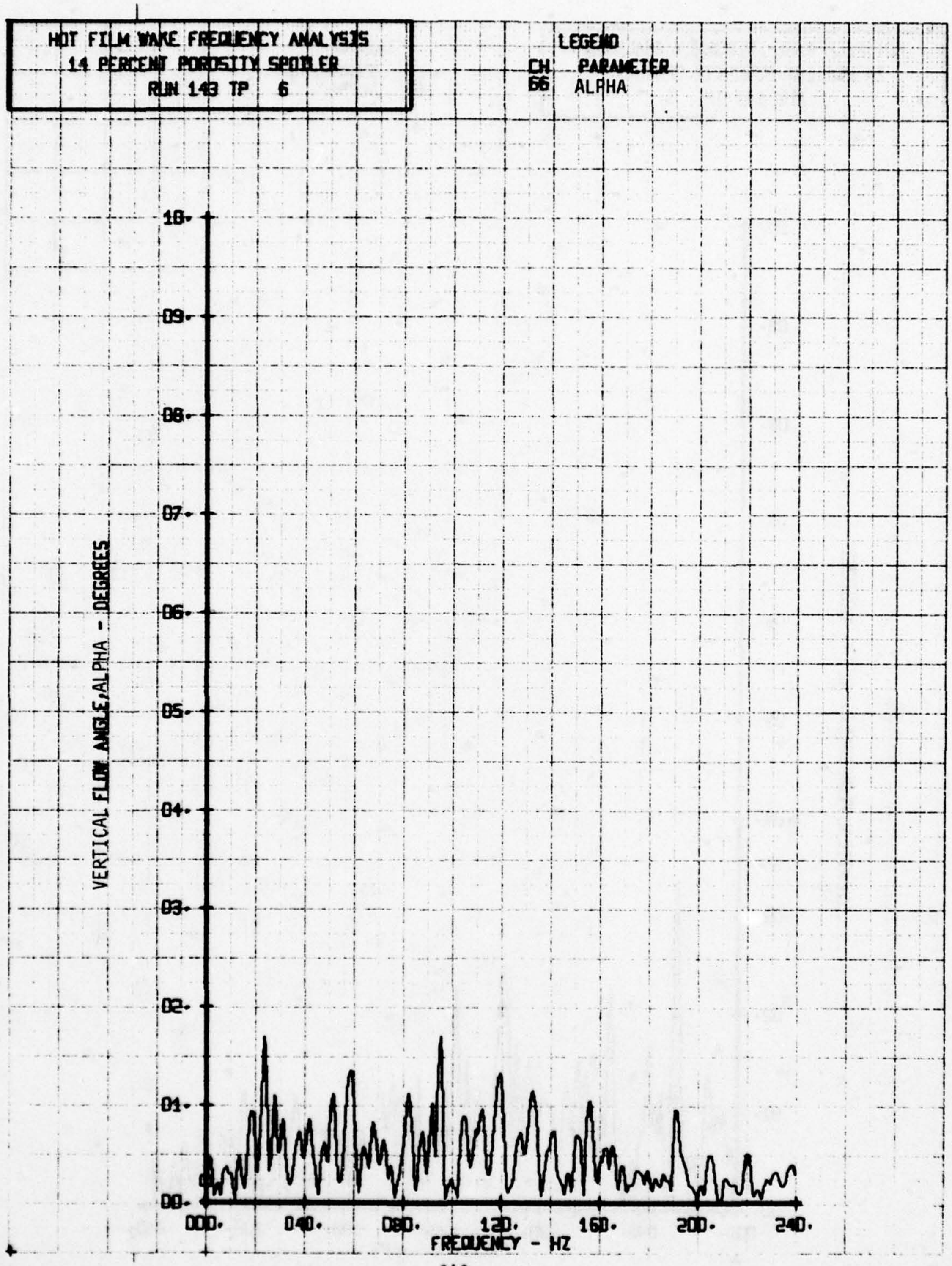
FREQUENCY - HZ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RUN 143 TP 6
LEGEND
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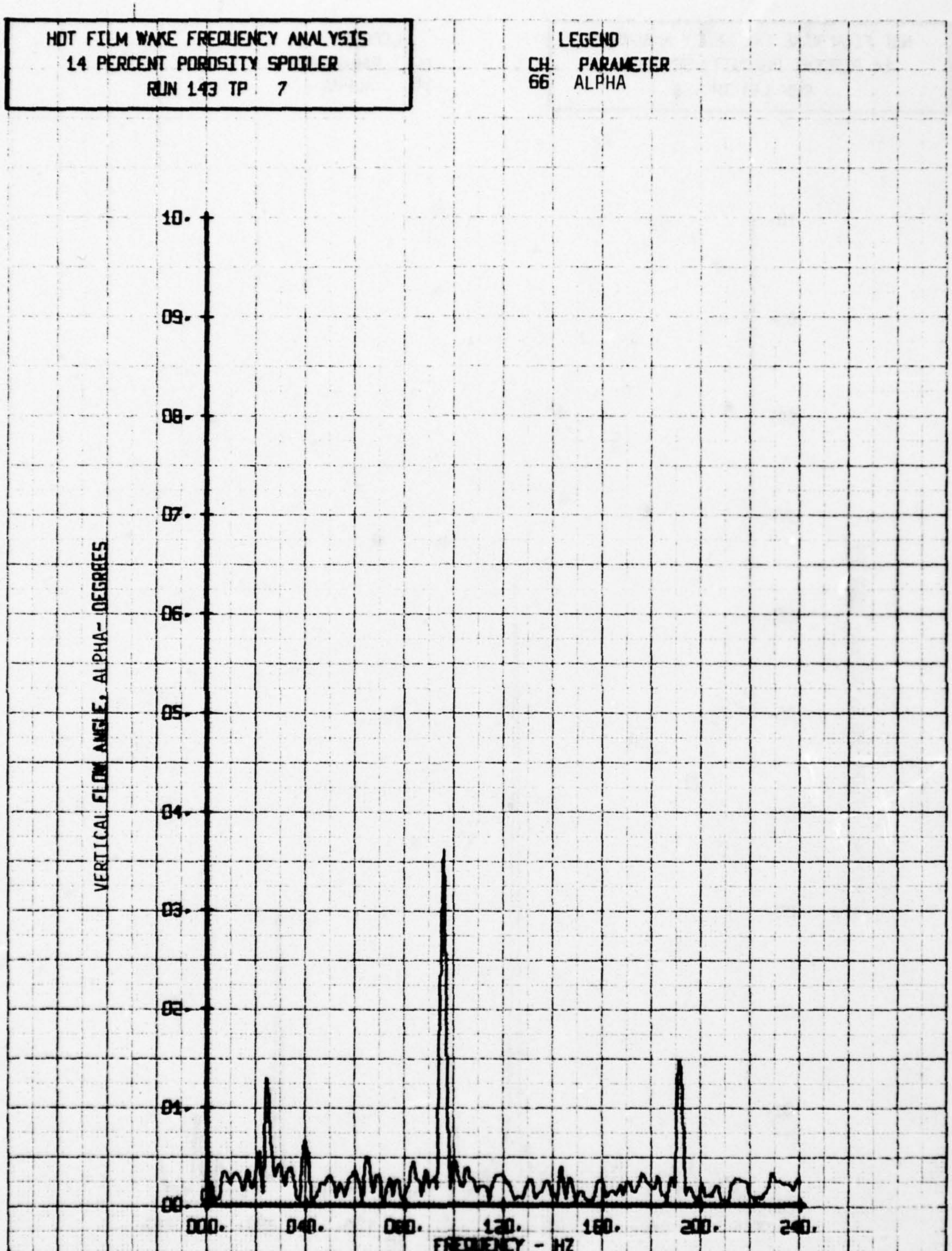
66 ALPHA
VERTICAL FLOW ANGLE,ALPHA - DEGREES
FREQUENCY - HZ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14 PERCENT POROSITY SPOILER
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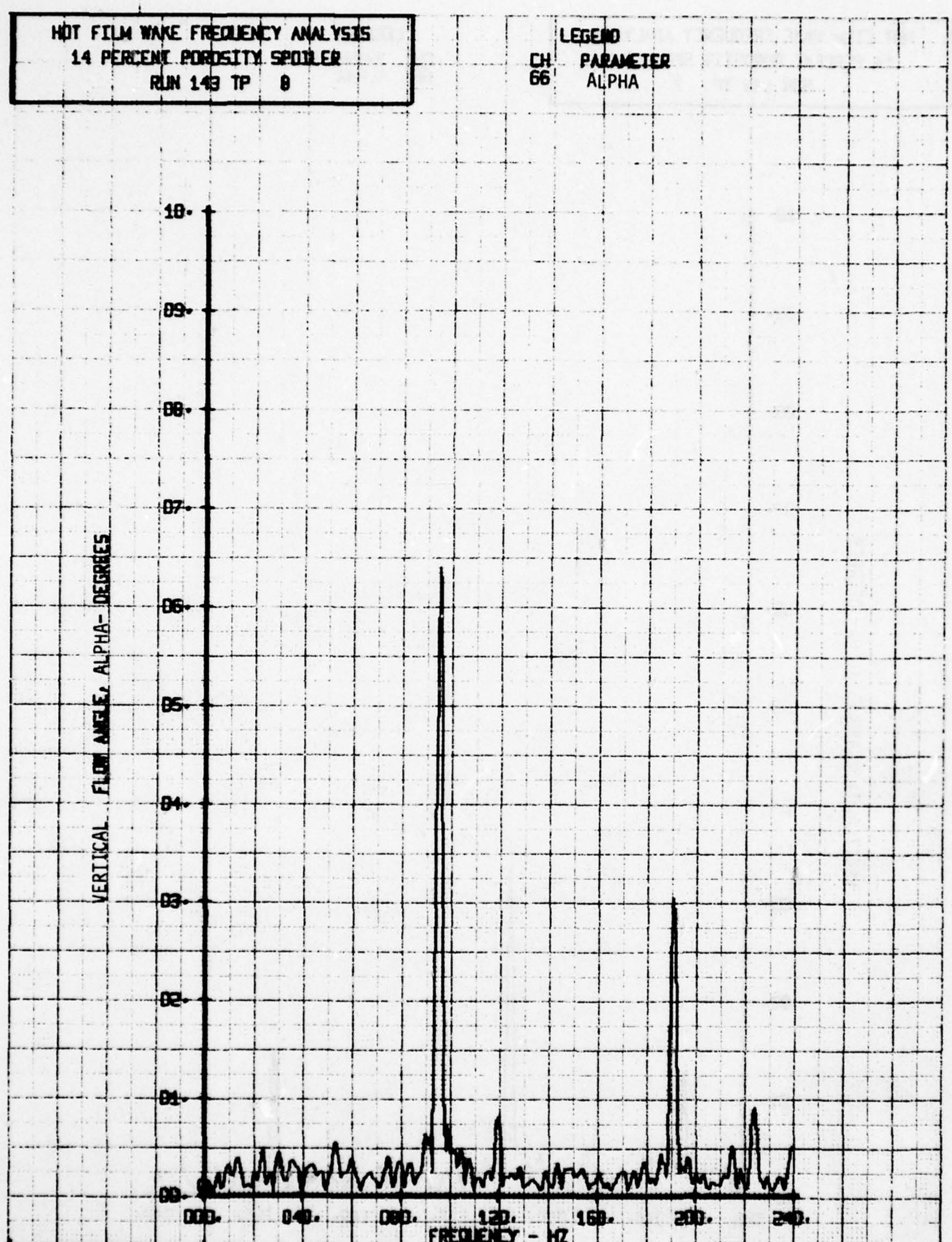
FREQUENCY - HZ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14 PERCENT POROSITY SPOILER
RUN 143 TP 8
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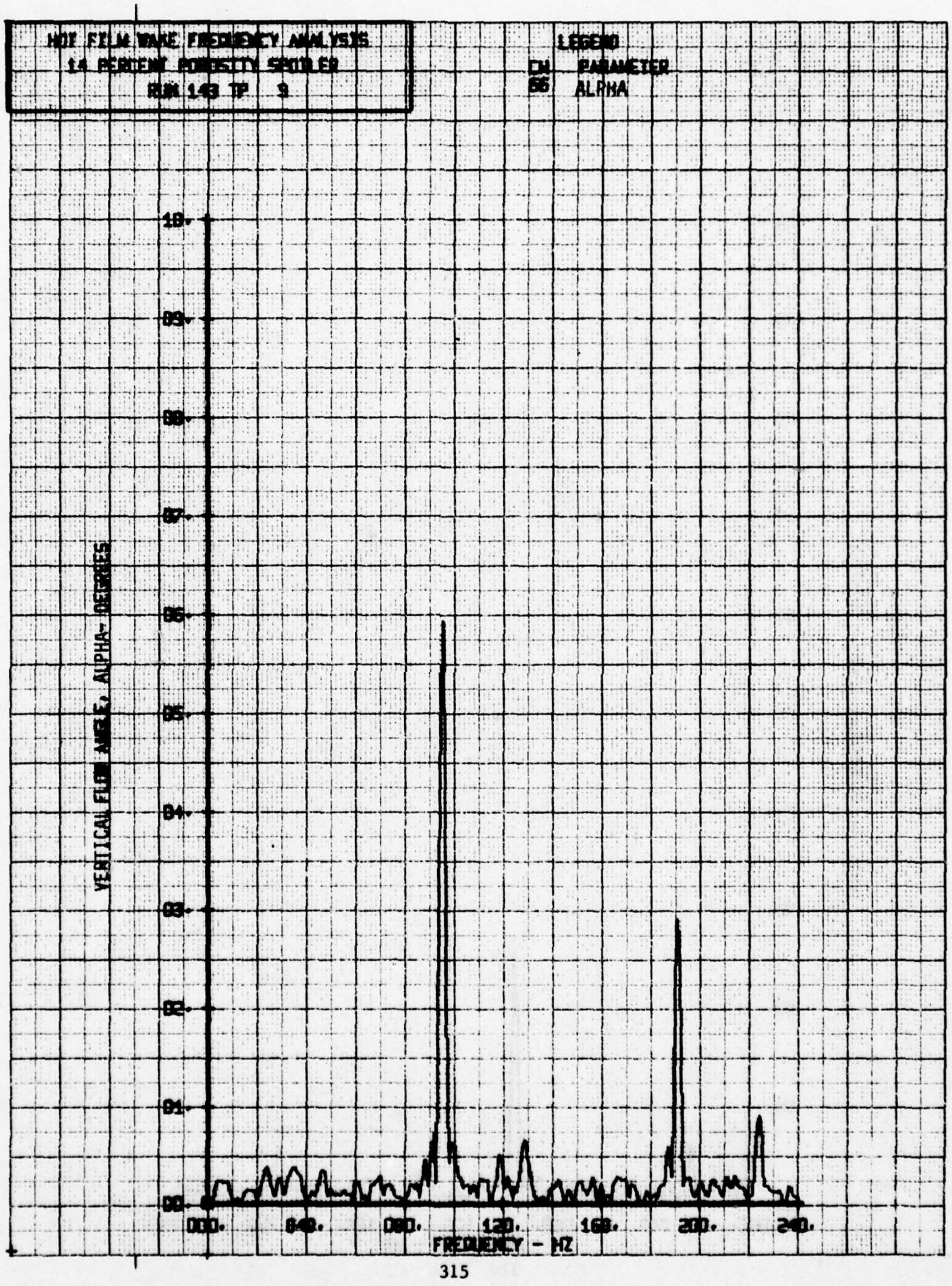

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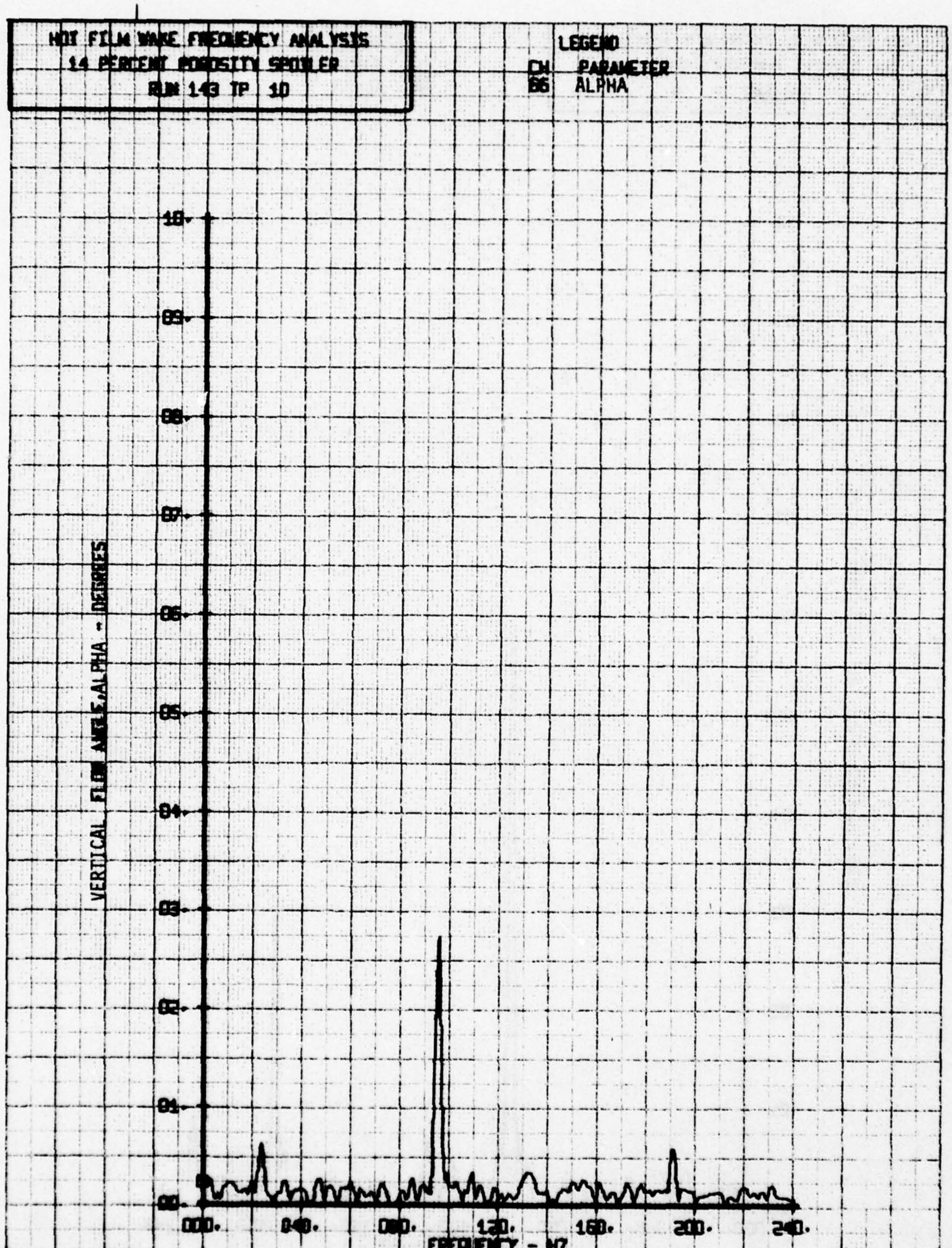
RUN 143 TP 9
LEGEND
CH PARAMETER
66 ALPHA
VERTICAL FLOW ANGLE, ALPHA- DEGREES
FREQUENCY - HZ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14 PERCENT POROSITY SPOILER
RUN 143 TP 10
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VERTICAL FLOW ANGLE,ALPHA - DEGREES
FREQUENCY - HZ
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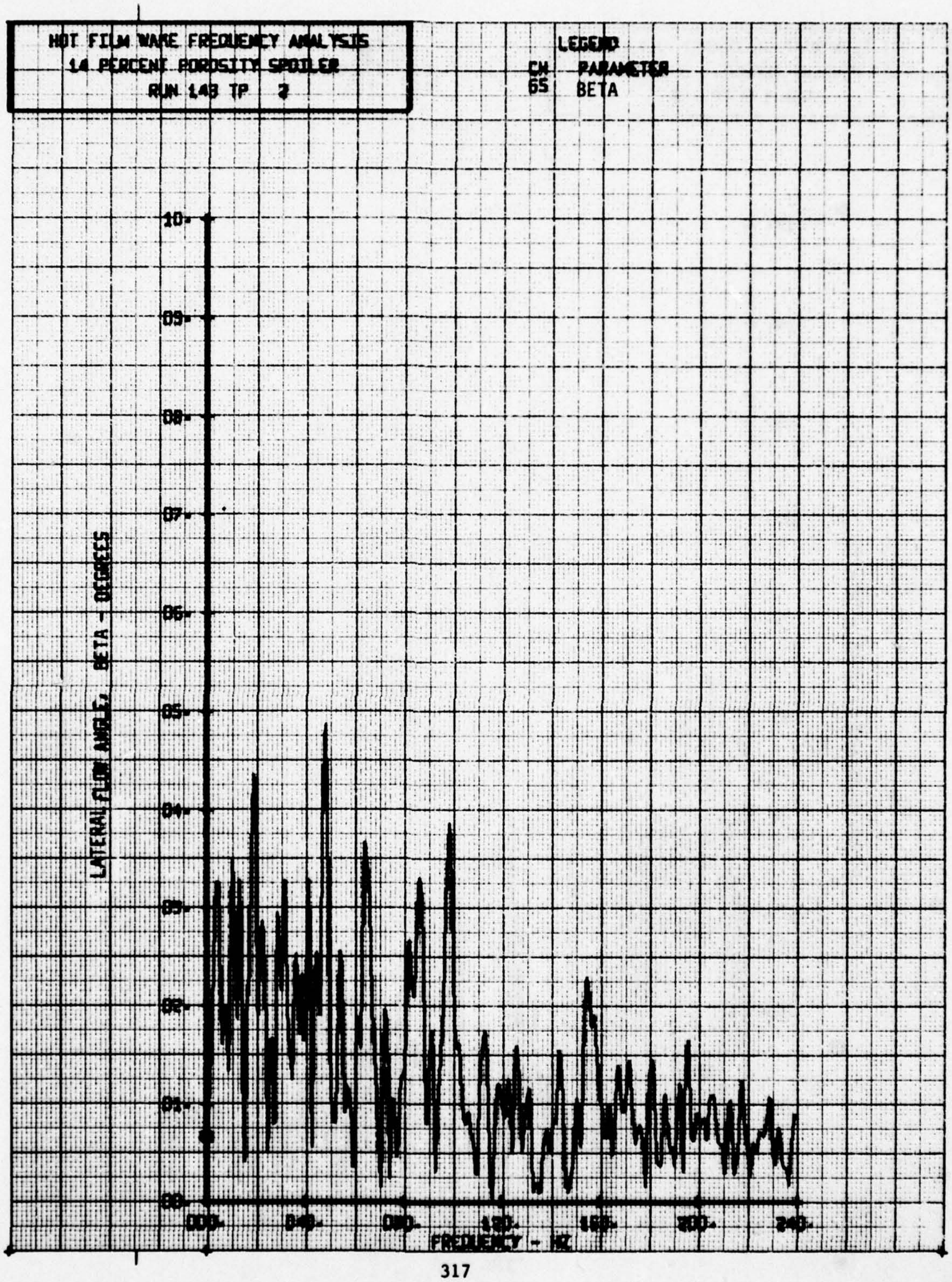

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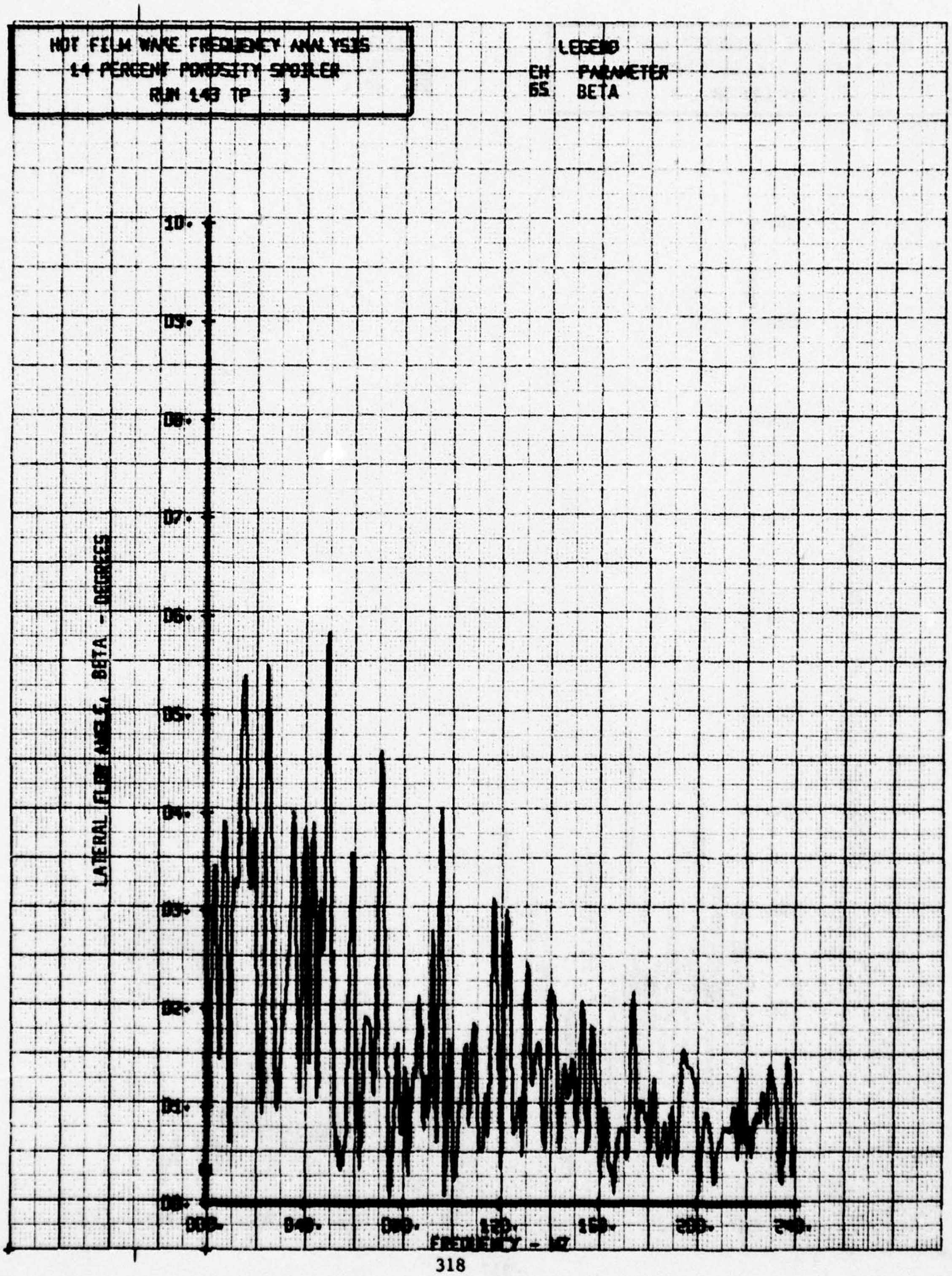
RUN 143 TP 2
LEGEND
CH PARAMETER
65 BETA
LATERAL FLOW ANGLE, BETA - DEGREES
FREQUENCY - HZ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RUN 143 TP 3
LEGEND
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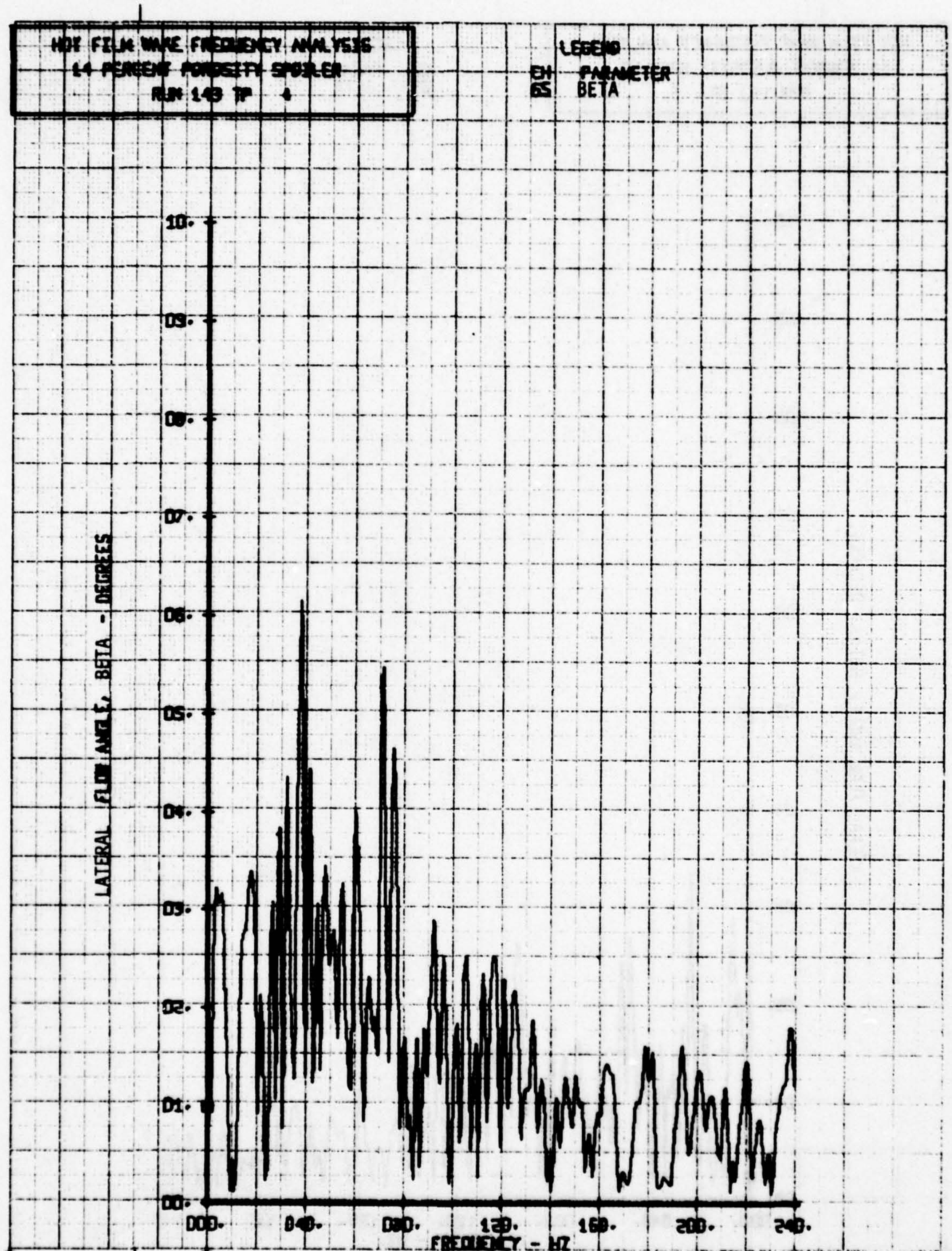
65 BETA
LATERAL FLOW ANGLE, BETA - DEGREES
FREQUENCY - HZ



HOT FILM WAKE FREQUENCY ANALYSIS
14 PERCENT POROSITY SPOILER
RUN 143 TP 4
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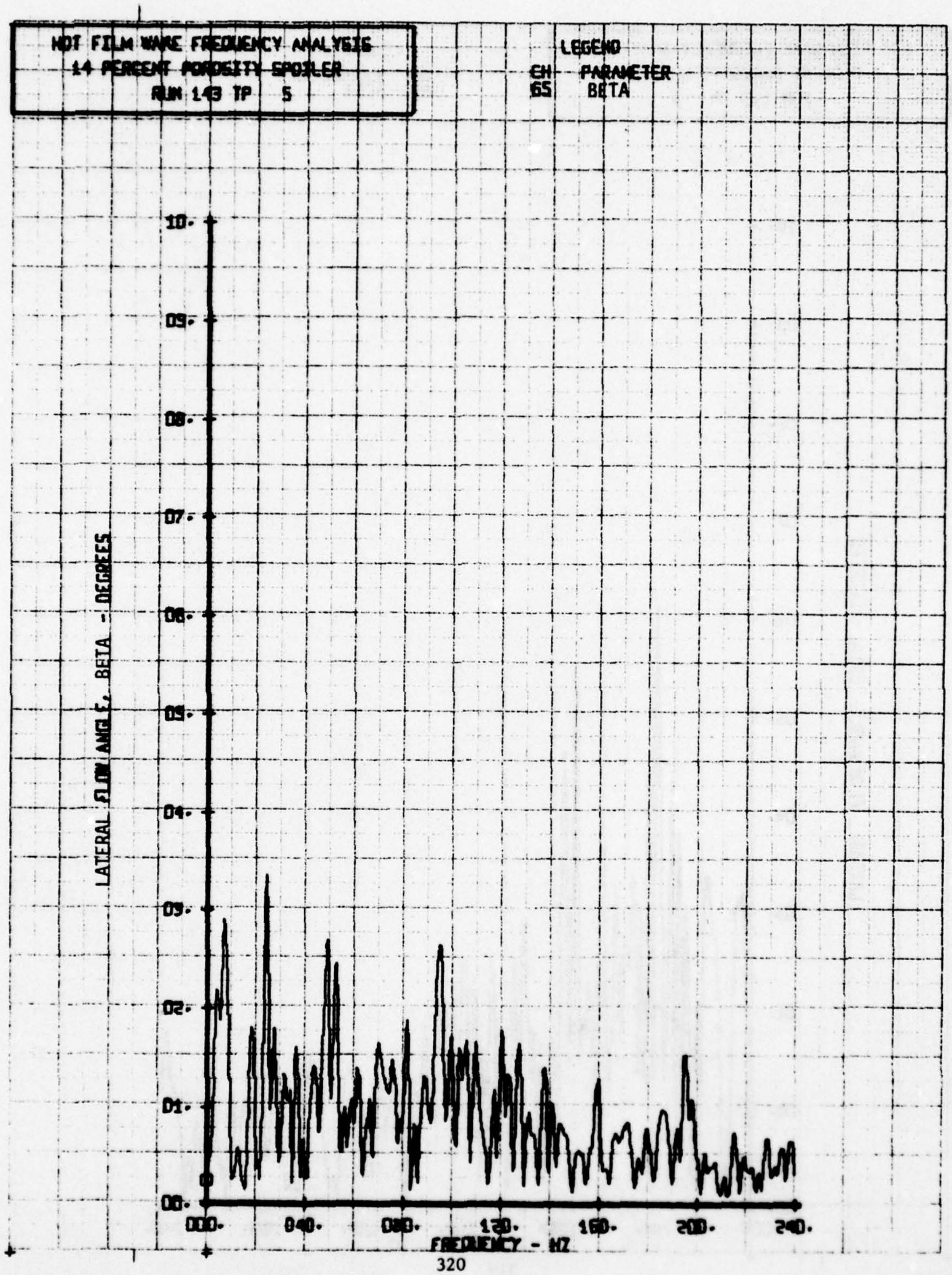
FREQUENCY - HZ



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14 PERCENT POROSITY SPOILER
RUN 143 TP 5
LEGEND
CH PARAMETER
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LATERAL FLOW ANGLE, BETA - DEGREES
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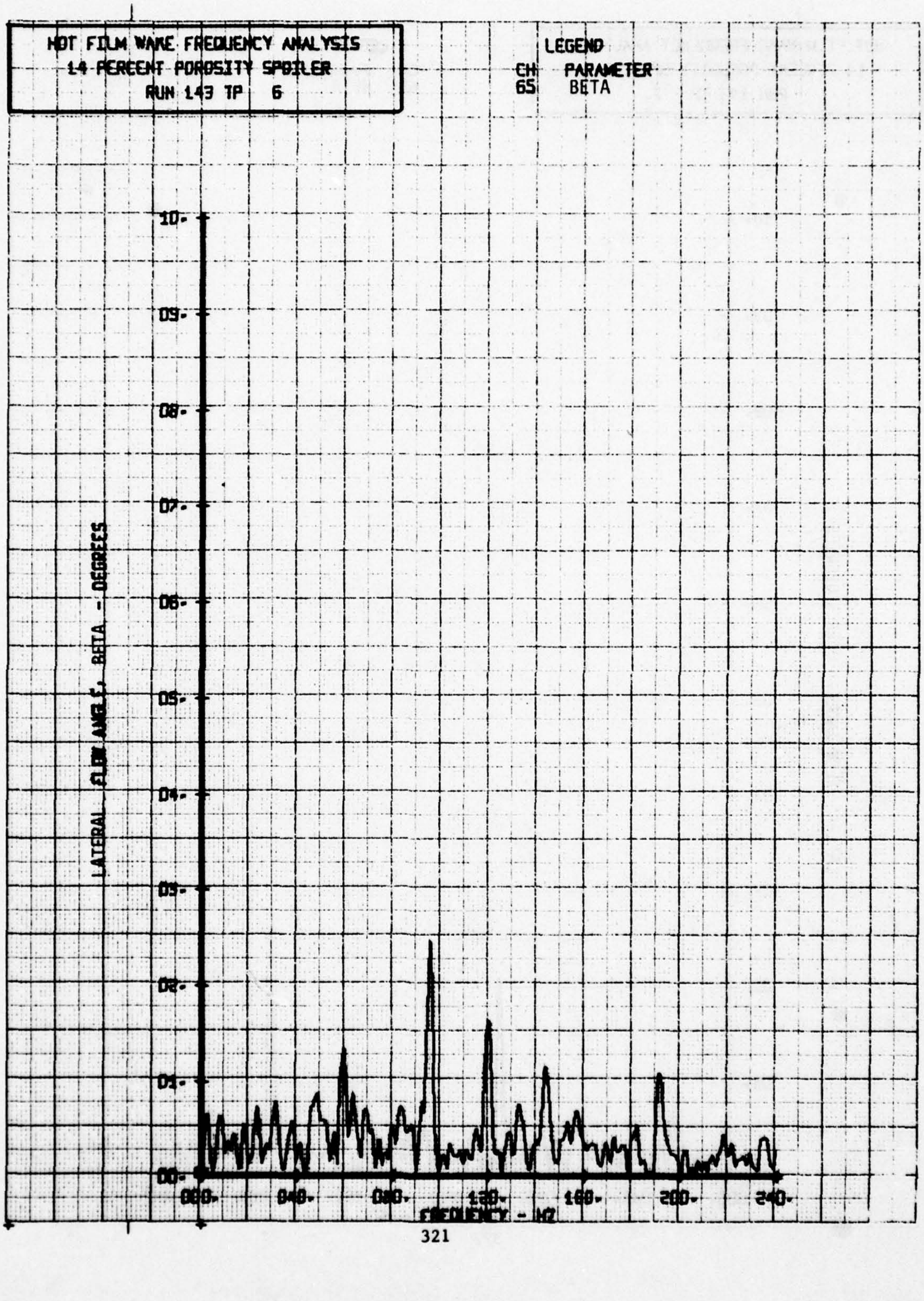
FREQUENCY - HZ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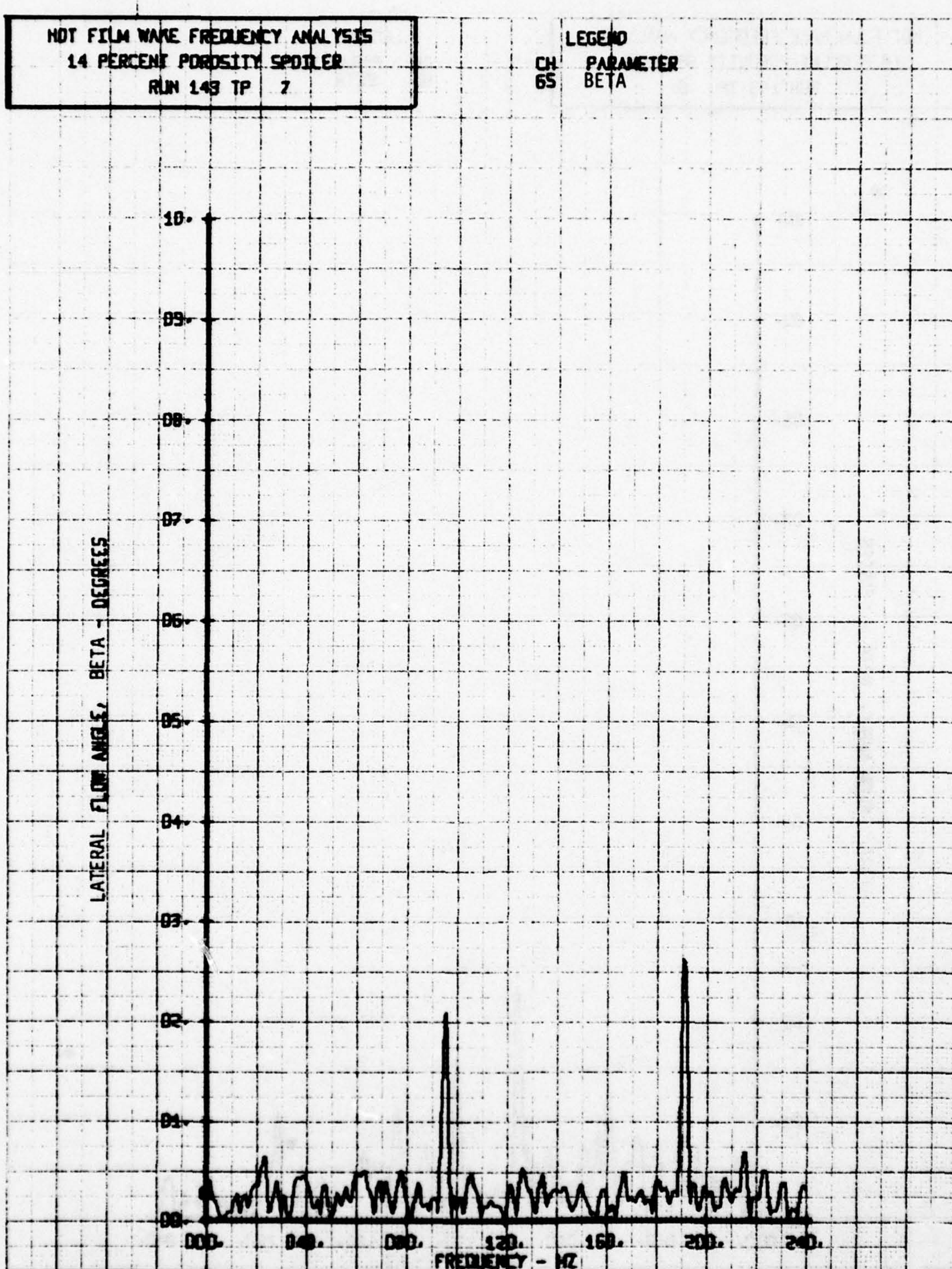
RUN 143 TP 6
LEGEND
CH PARAMETER
65 BETA
LATERAL FLOW ANGLE, BETA - DEGREES
FREQUENCY - HZ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14 PERCENT POROSITY SPOILER
RUN 143 TP 7
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LATERAL FLOW ANGLE, BETA - DEGREES
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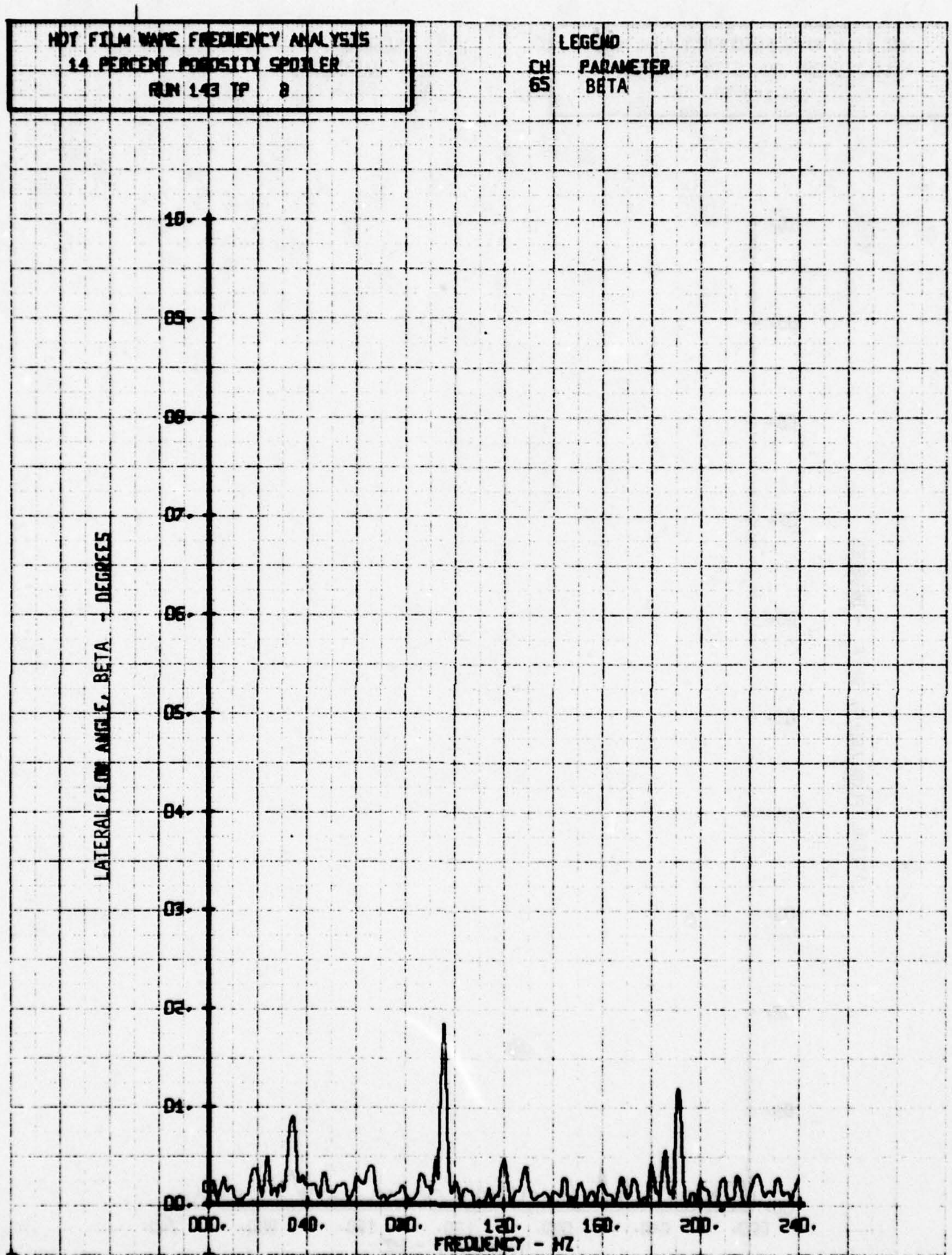
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14 PERCENT POROSITY SPOILER
RUN 143 TP 8
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LATERAL FLOW ANGLE, BETA - DEGREES
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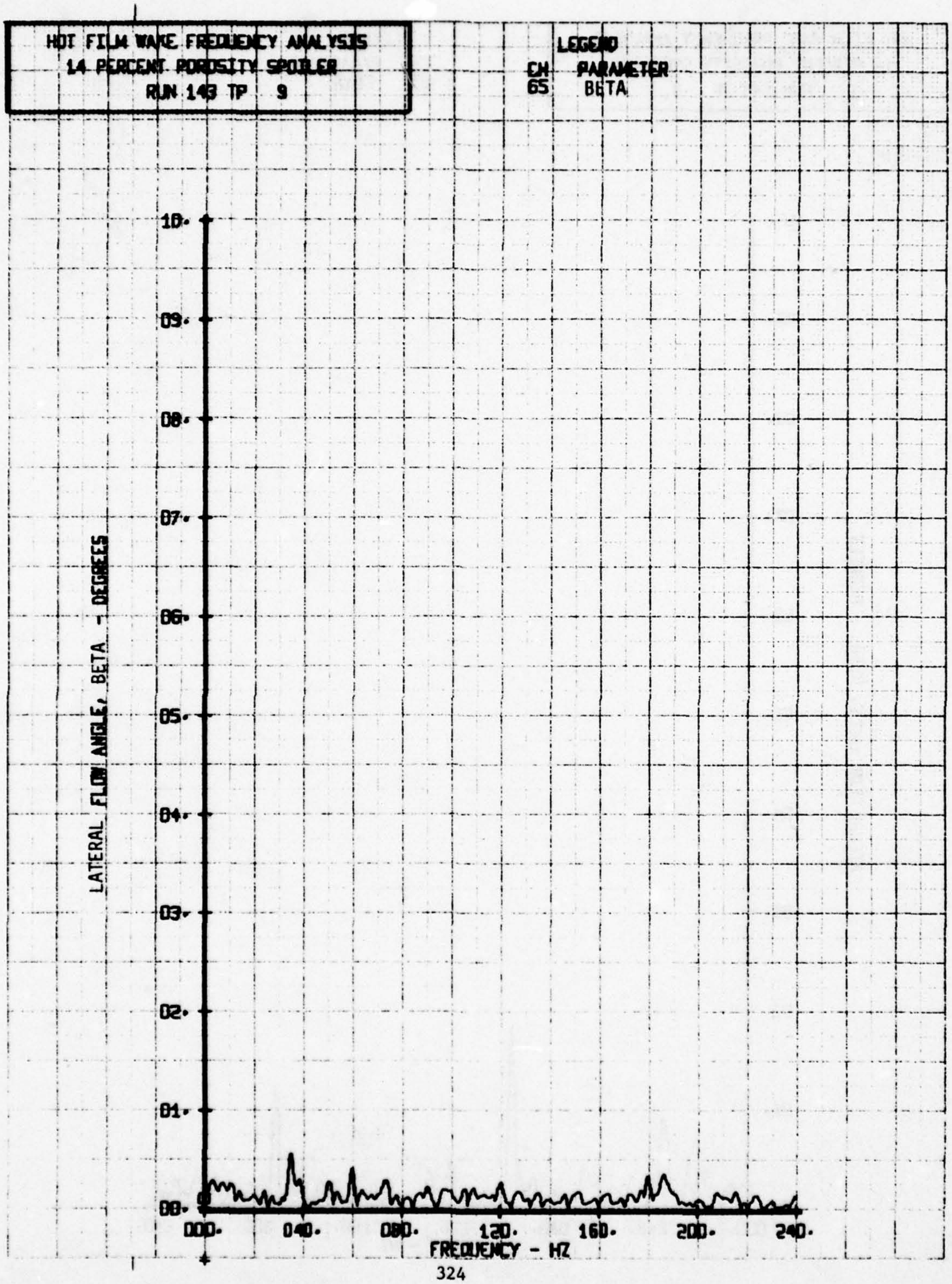

HOT FILM WAKE FREQUENCY ANALYSIS
14 PERCENT POROSITY SPOILER
RUN 143 TP 9
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LATERAL FLOW ANGLE, BETA - DEGREES
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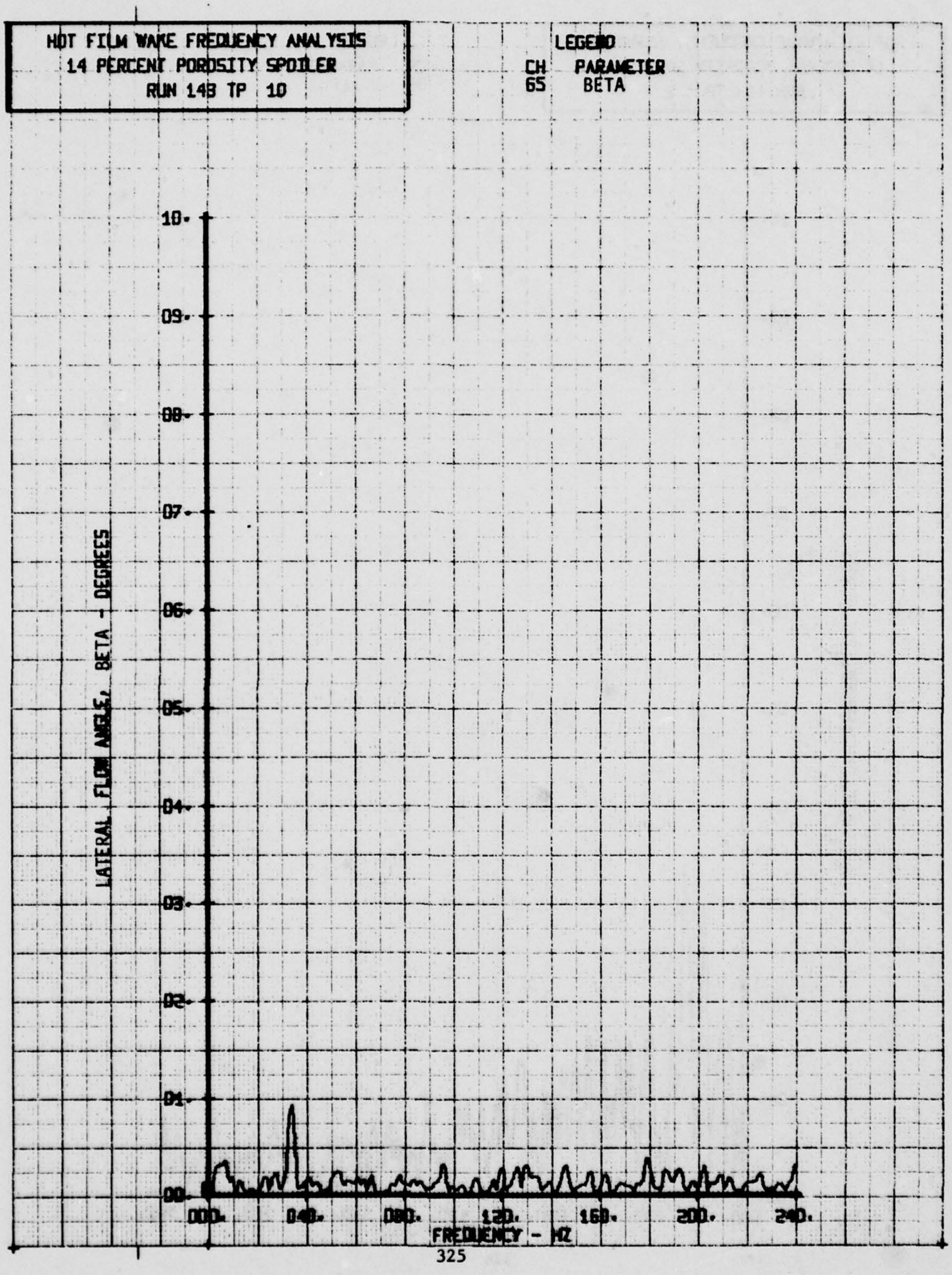
FREQUENCY - HZ



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RUN 143 TP 10
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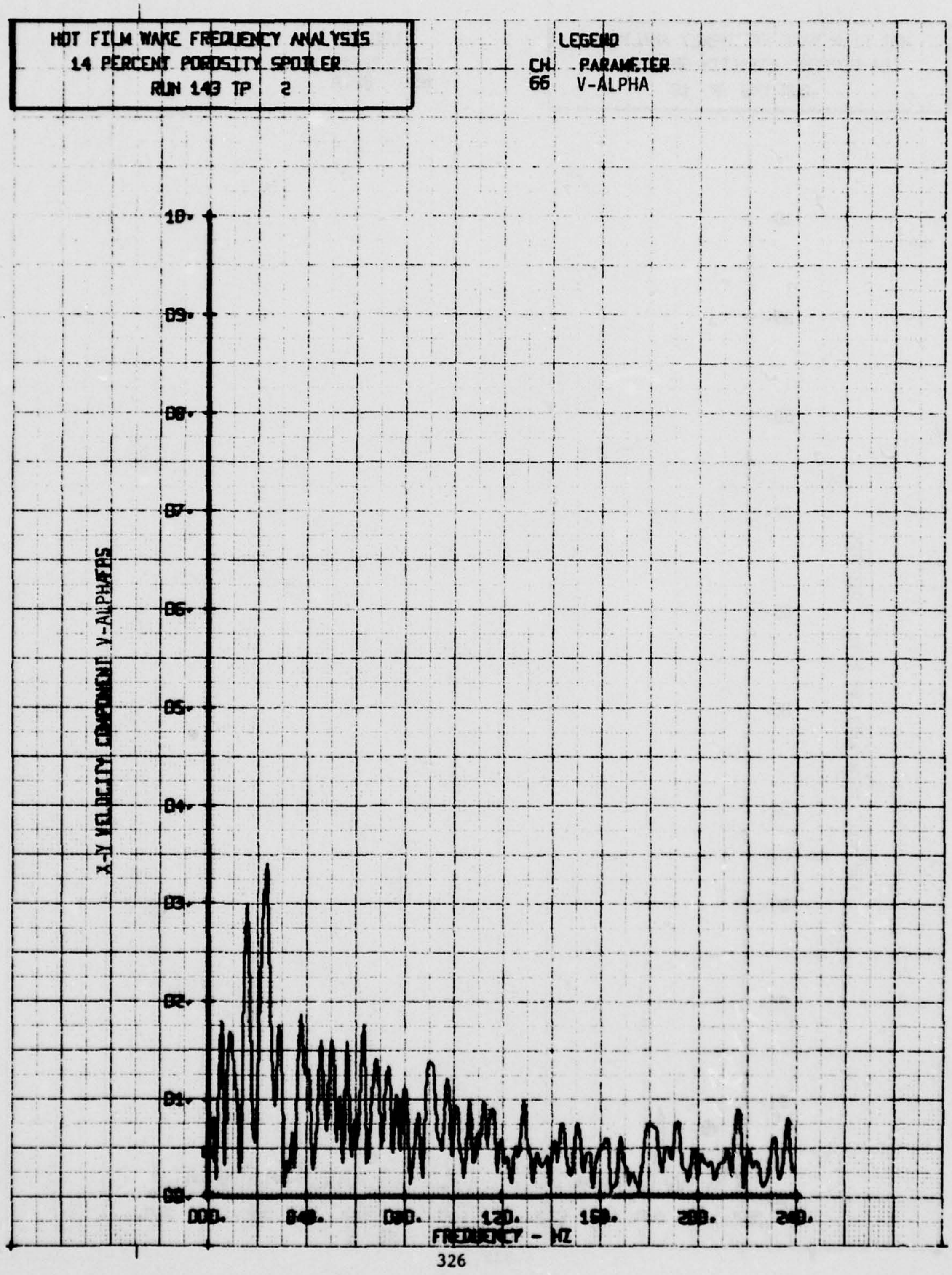
LATERAL FLOW ANGLE, BETA - DEGREES
FREQUENCY - HZ



HOT FILM WAKE FREQUENCY ANALYSIS
14 PERCENT POROSITY SPOILER
RUN 143 TP 2
LEGEND
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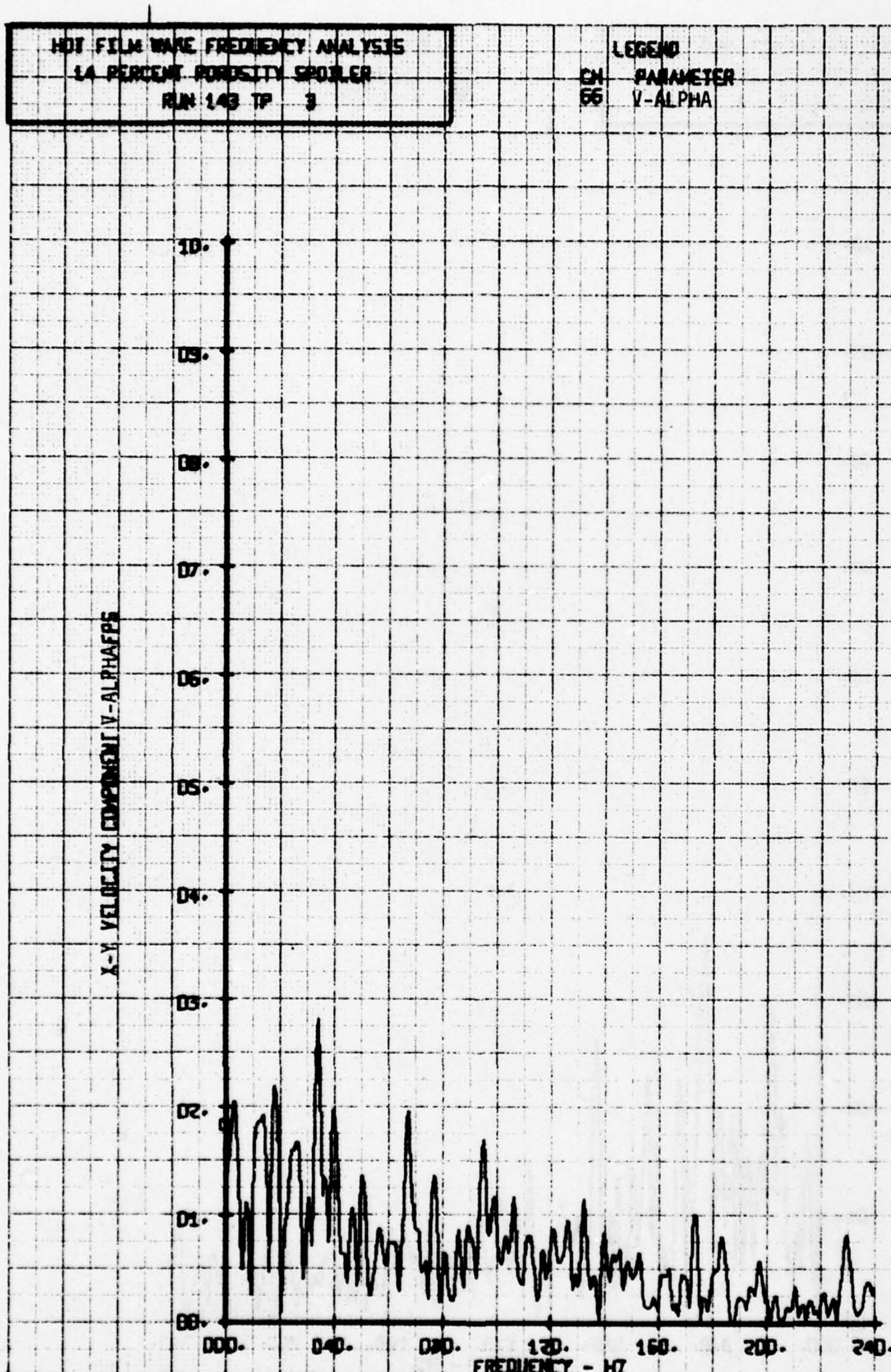
66 V-ALPHA
X-Y VELOCITY COMPONENT V-ALPHAFPS
FREQUENCY - HZ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14 PERCENT POROSITY SPOILER
RUN 143 TP 3
LEGEND
CH PARAMETER
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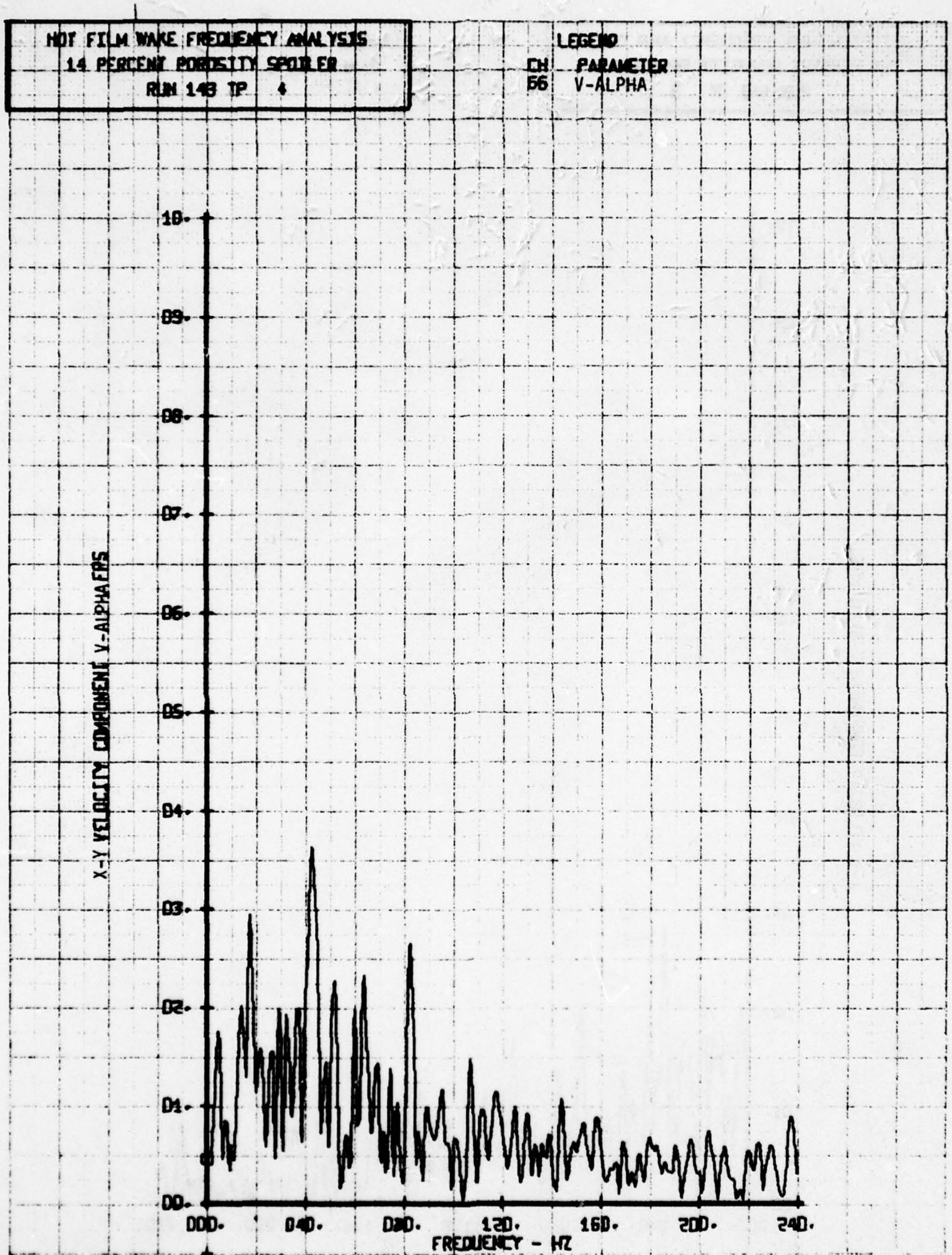

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14 PERCENT POROSITY SPOILER
RUN 143 TP 4
LEGEND
CH PARAMETER
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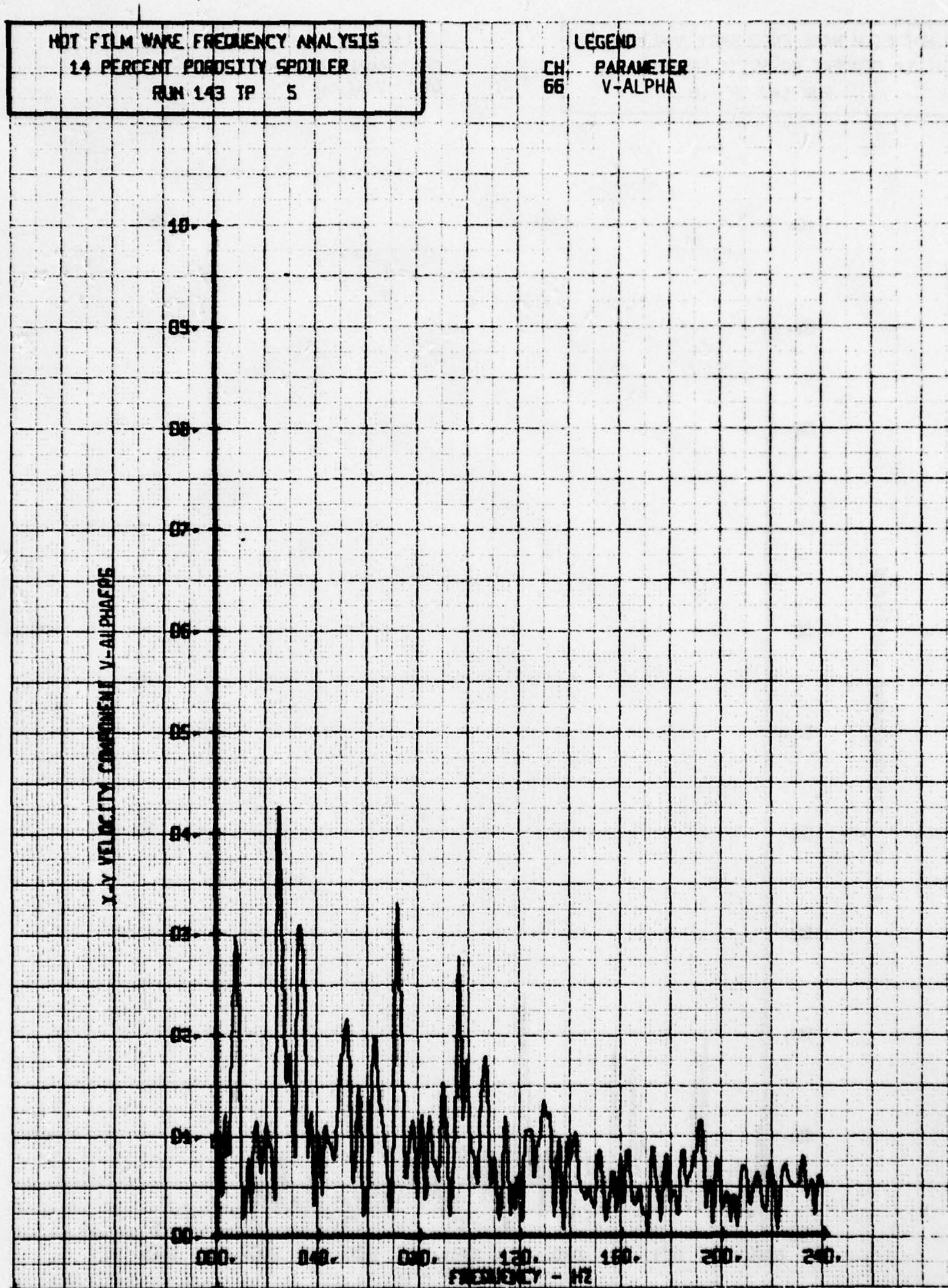
X-Y VELOCITY COMPONENT V-ALPHA FPS
FREQUENCY - HZ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14 PERCENT POROSITY SPOILER
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LEGEND
CH. PARAMETER
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X-Y VELOCITY COMPONENT V-ALPHAERS
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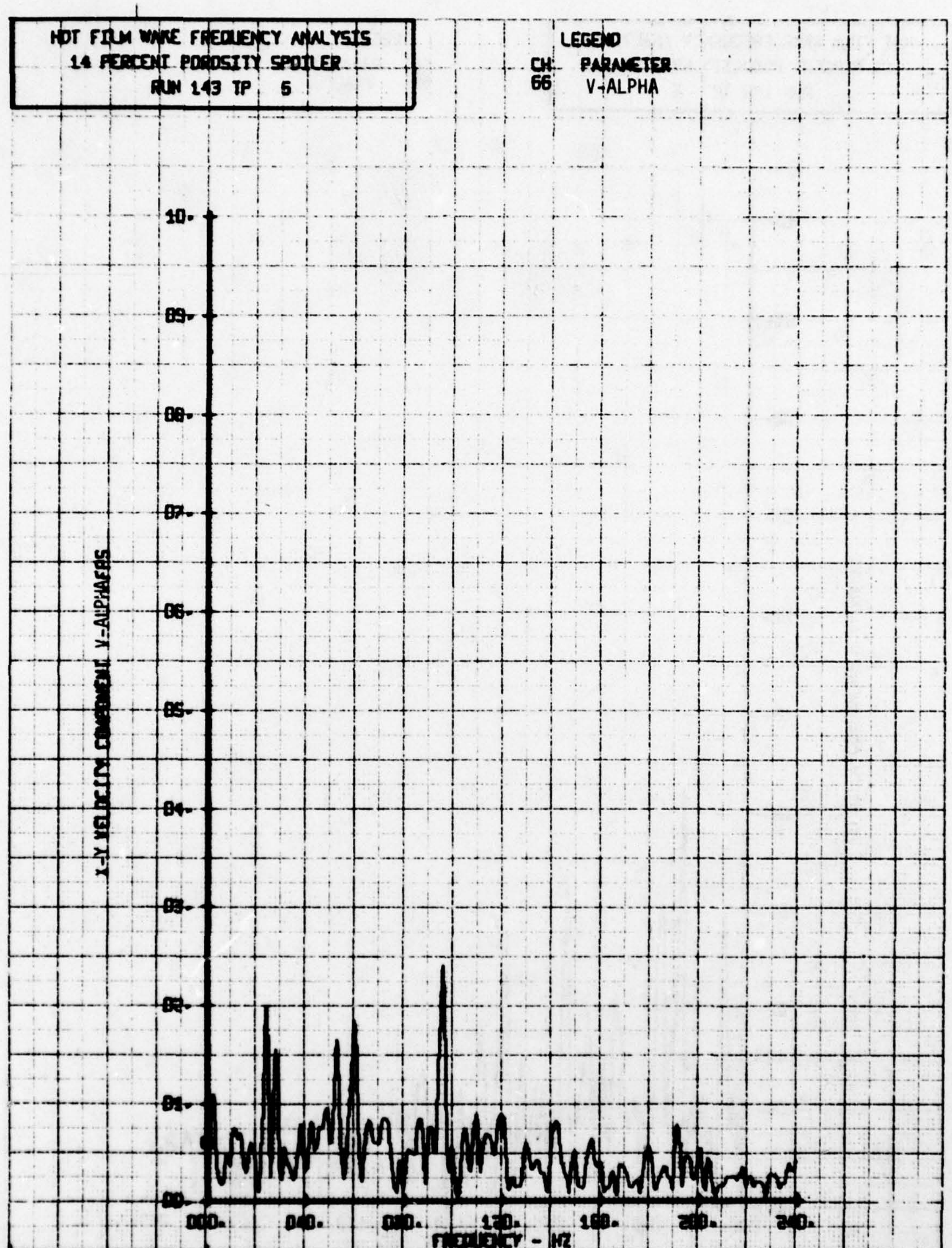
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14 PERCENT POROSITY SPOILER
RUN 143 TP 6
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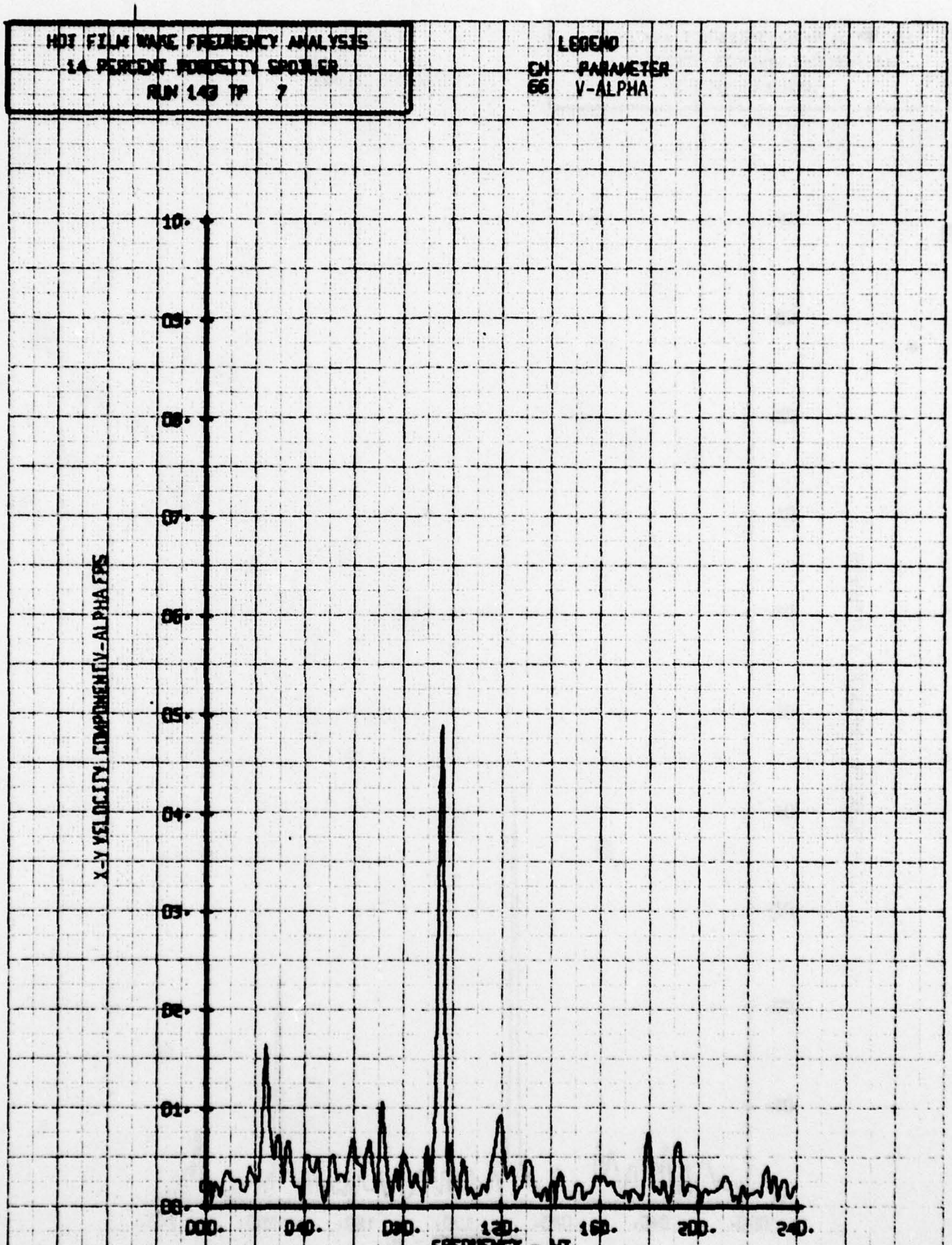

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14 PERCENT POROSITY SPOILER
RUN 143 TP 7
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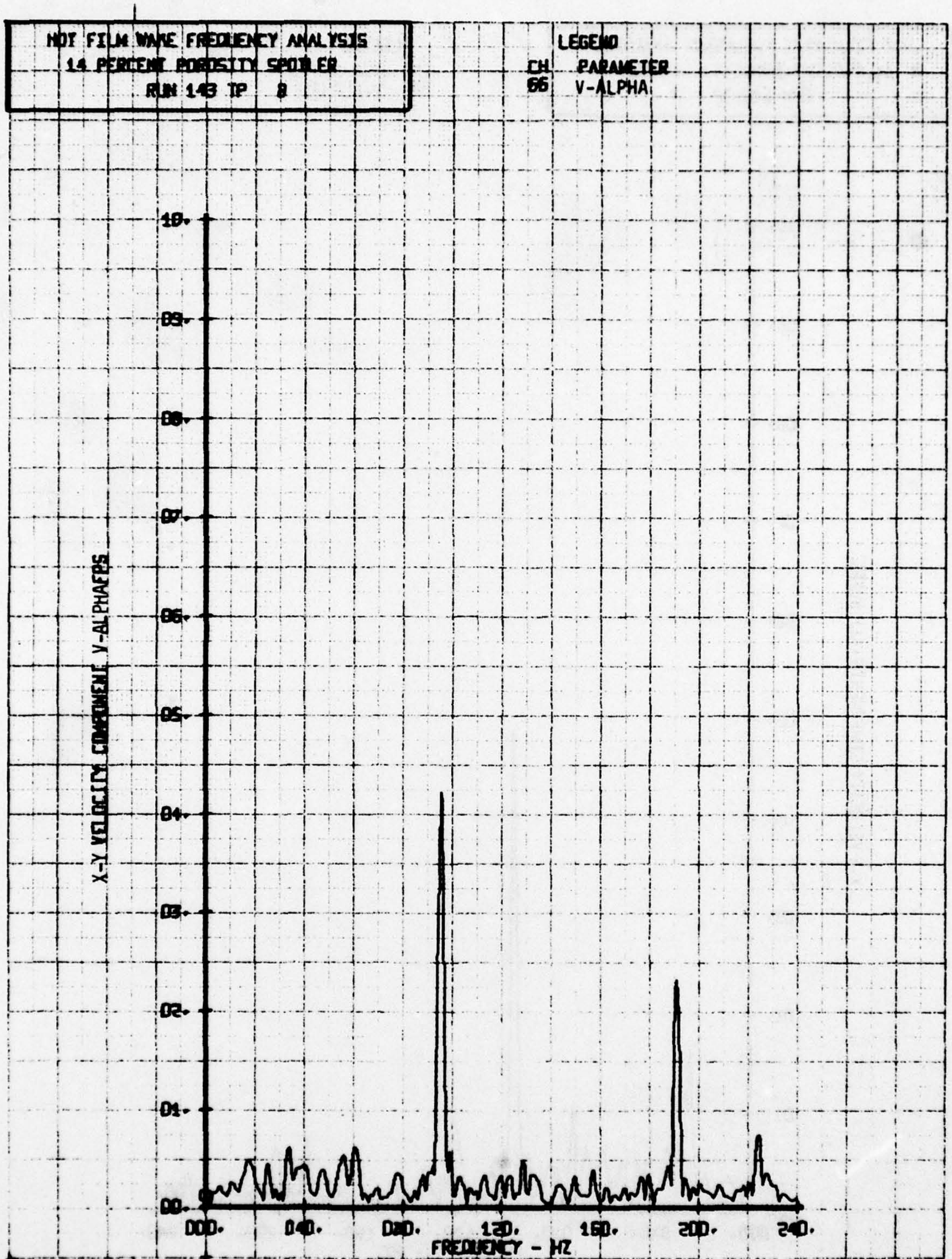
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RUN 143 TP 8
LEGEND
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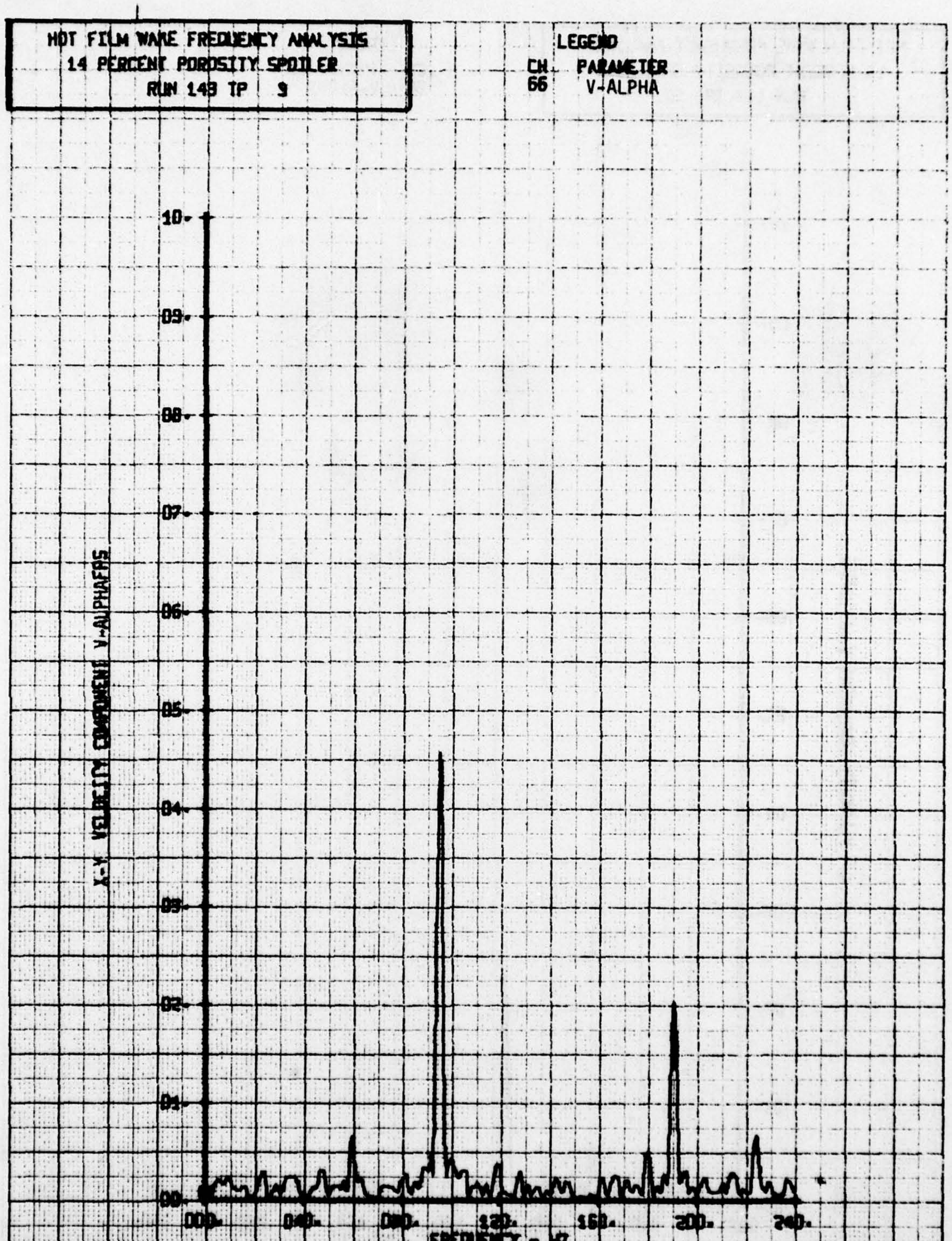
FREQUENCY - HZ


HOT FILM WAKE FREQUENCY ANALYSIS
14 PERCENT POROSITY SPOILER
RUN 143 TP 3
LEGEND
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X-Y VELOCITY COMPONENT V-ALPHAFPS
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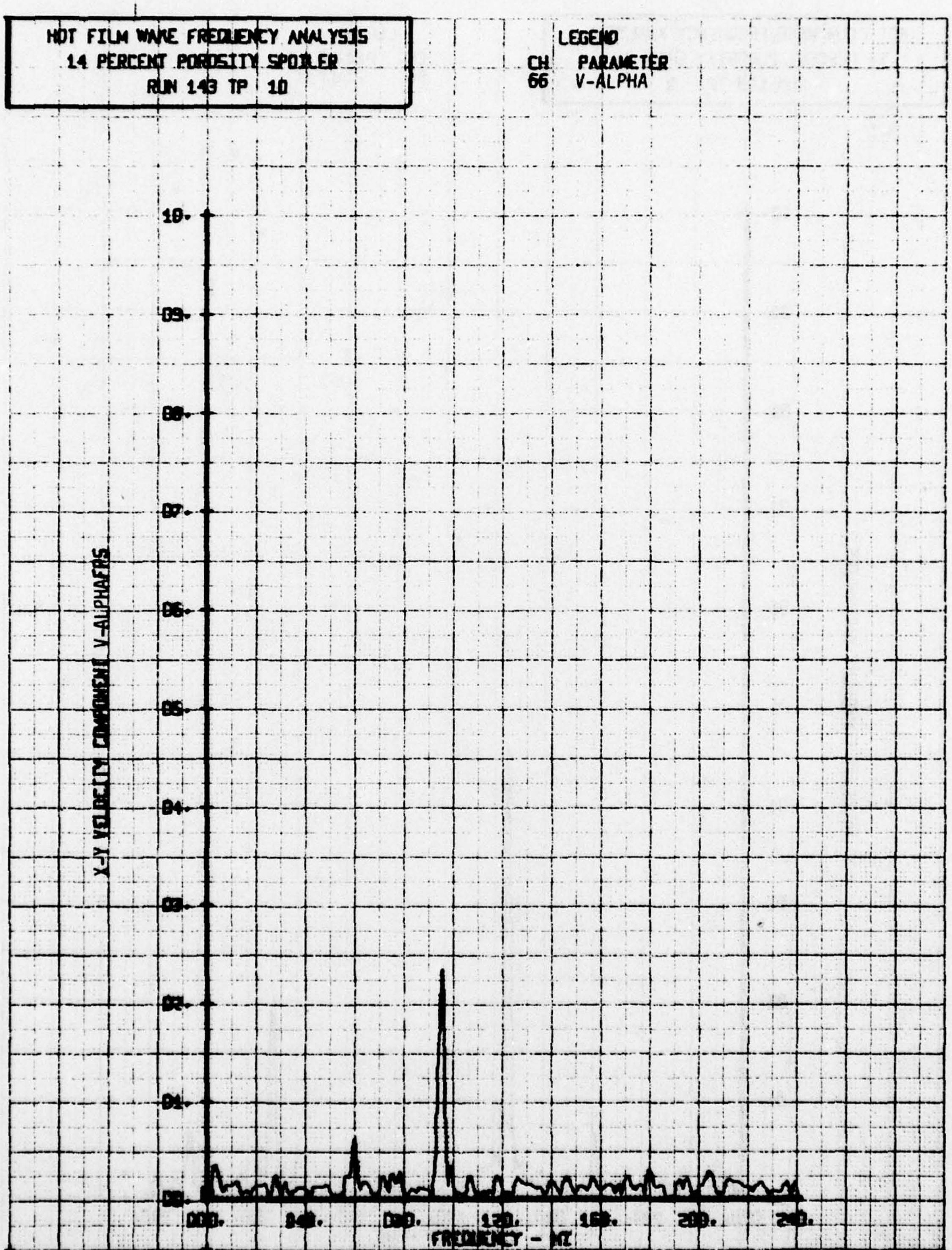
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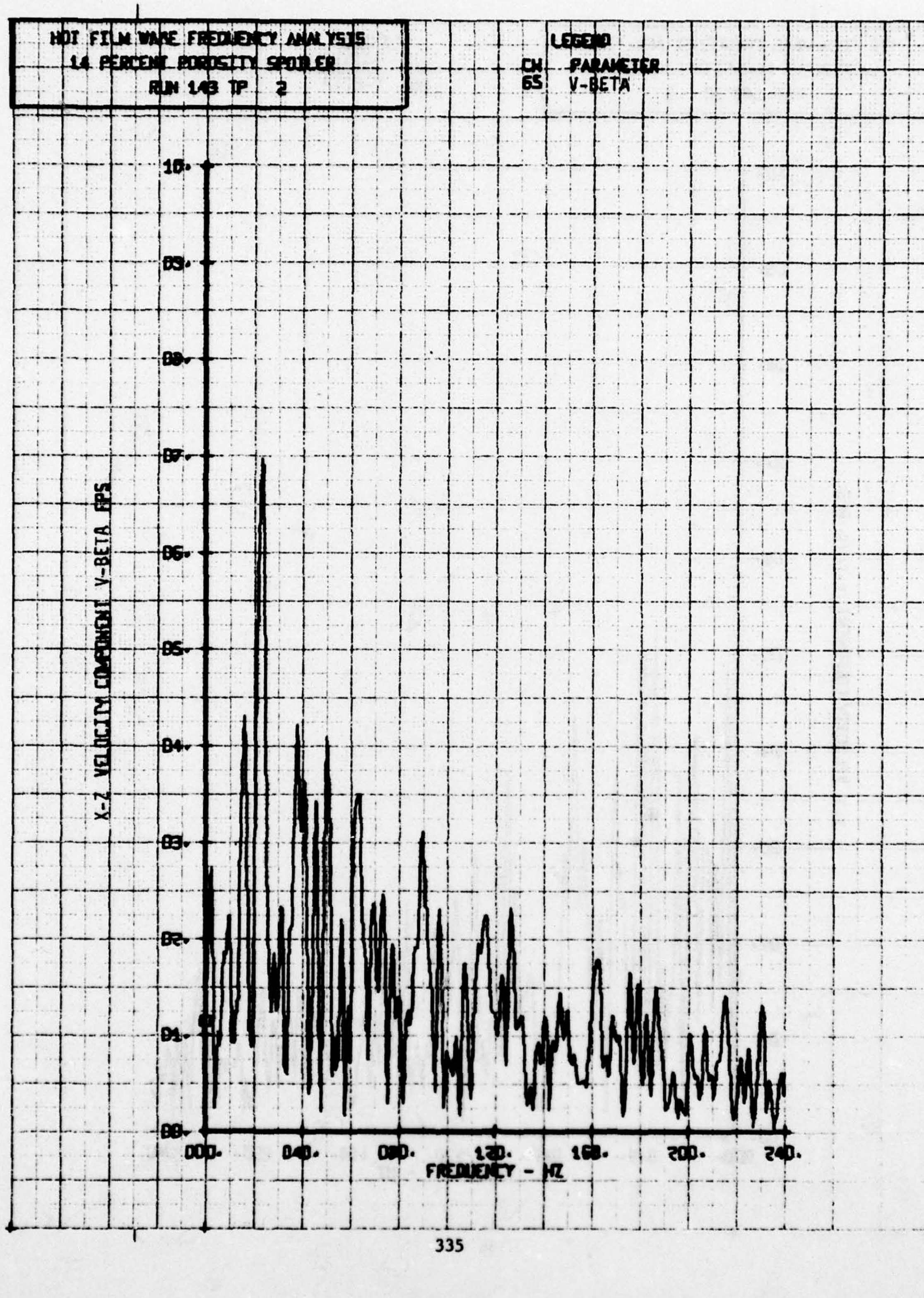

HOT FILM WAKE FREQUENCY ANALYSIS
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LEGEND
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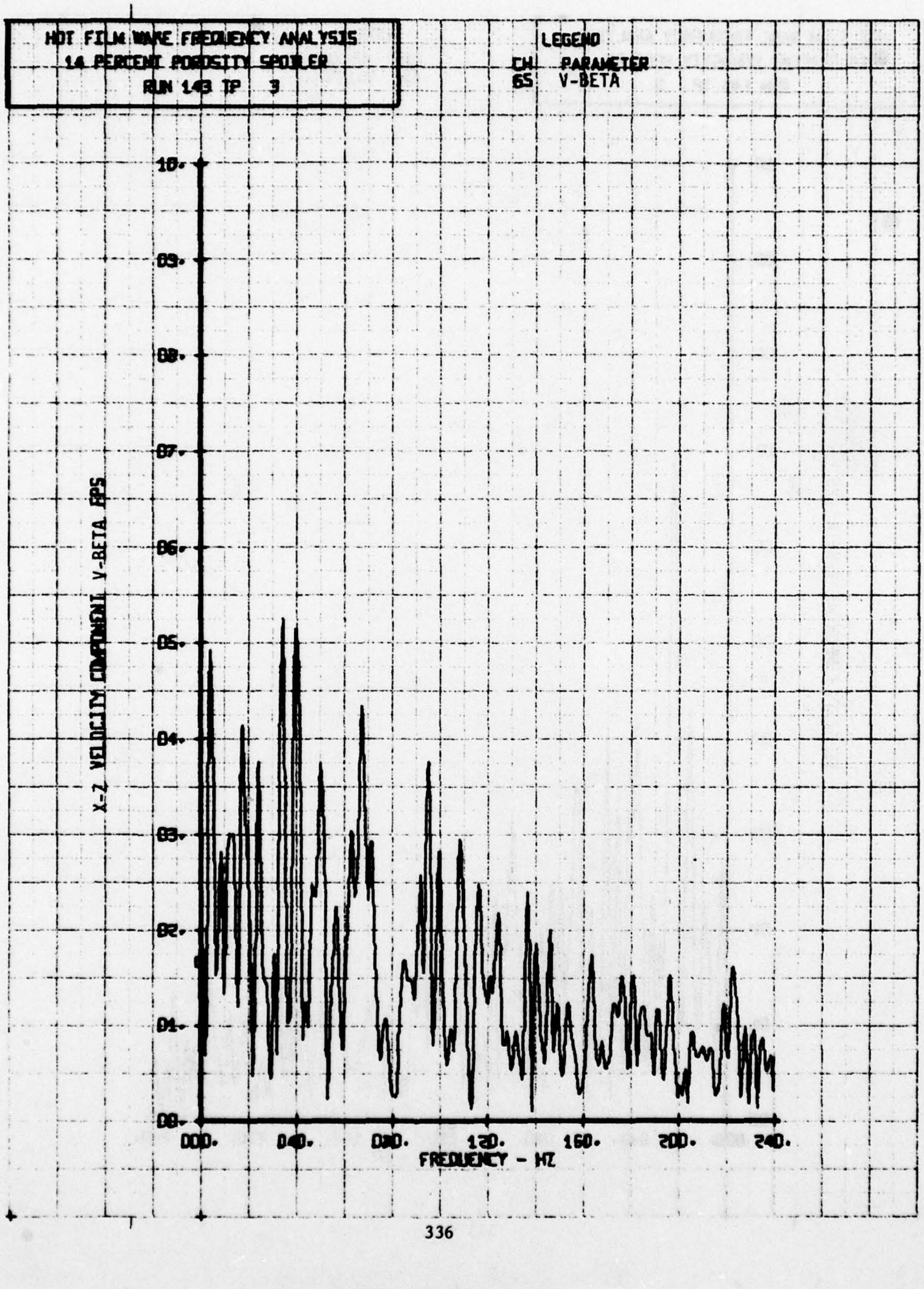

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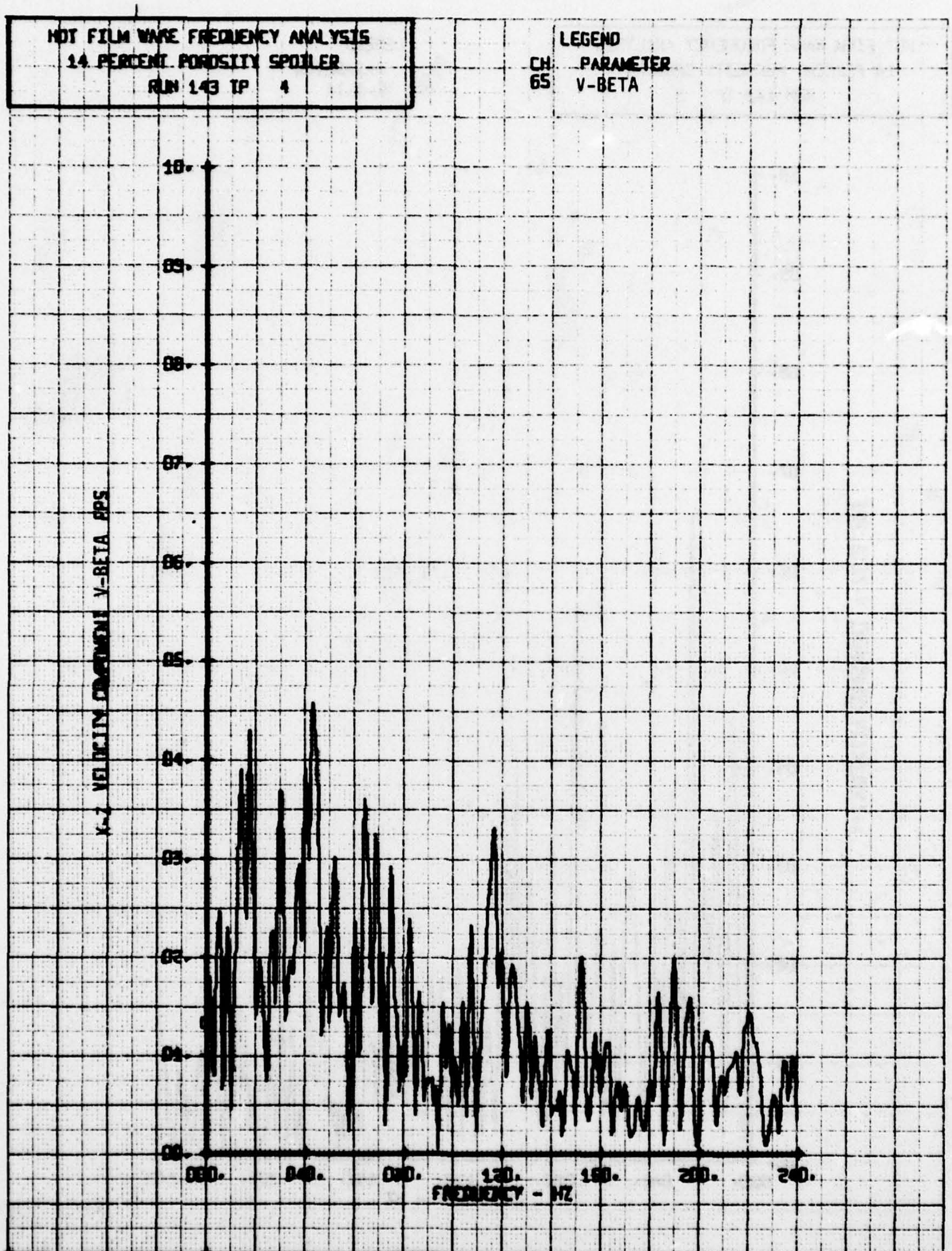

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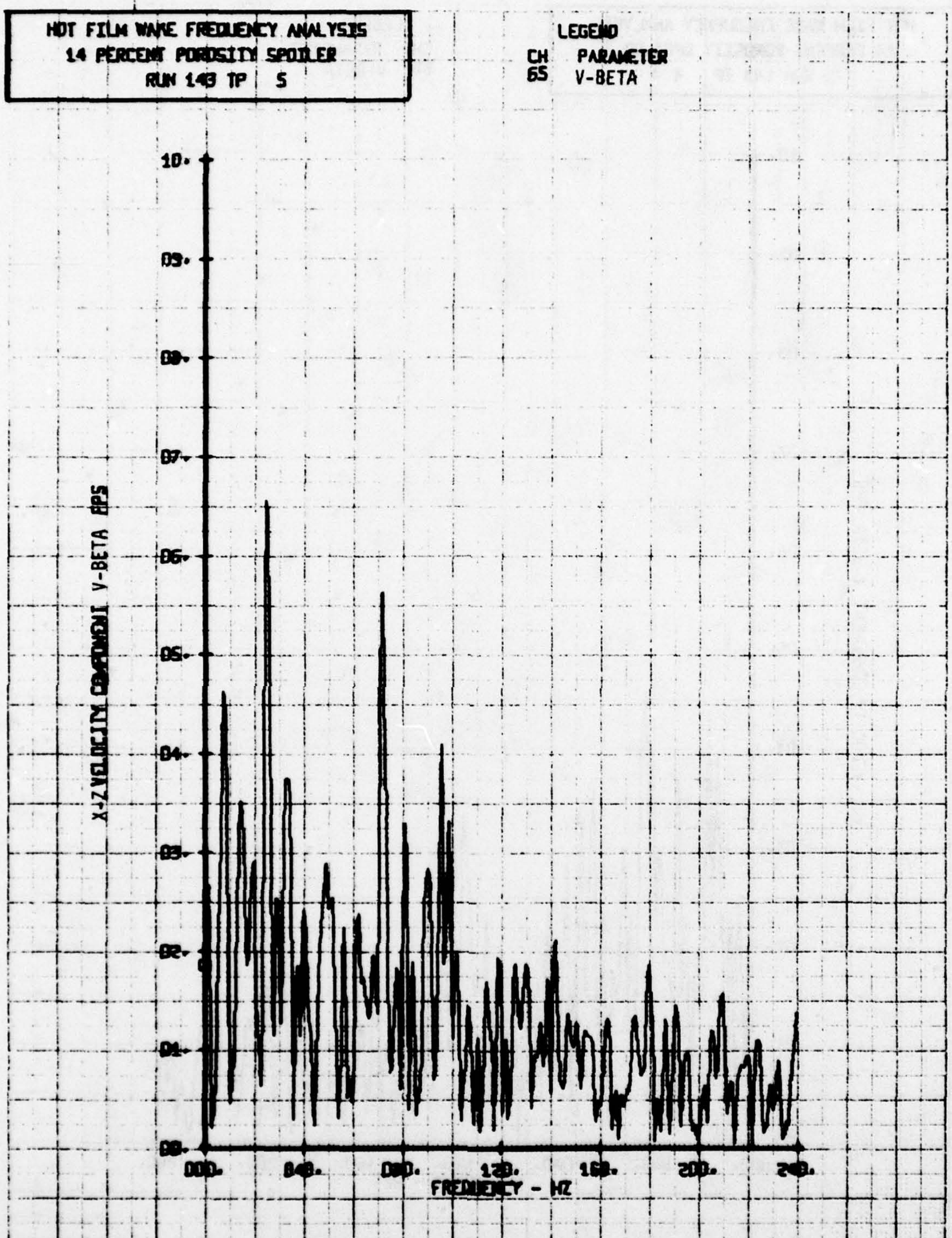
X-Z VELOCITY COMPONENT V-BETA RPS
FREQUENCY - HZ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14 PERCENT POROSITY SPOILER
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LEGEND
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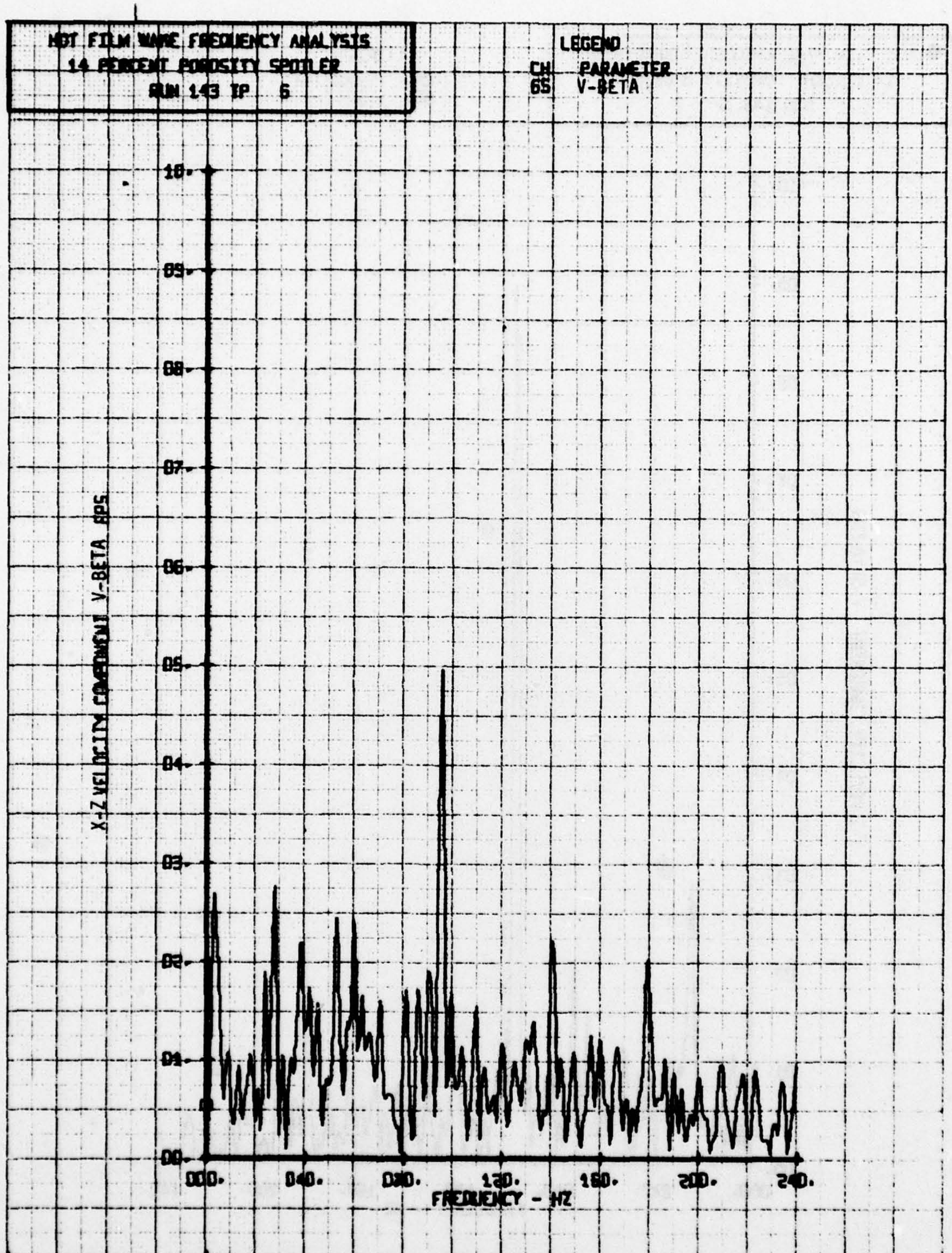
FREQUENCY - HZ



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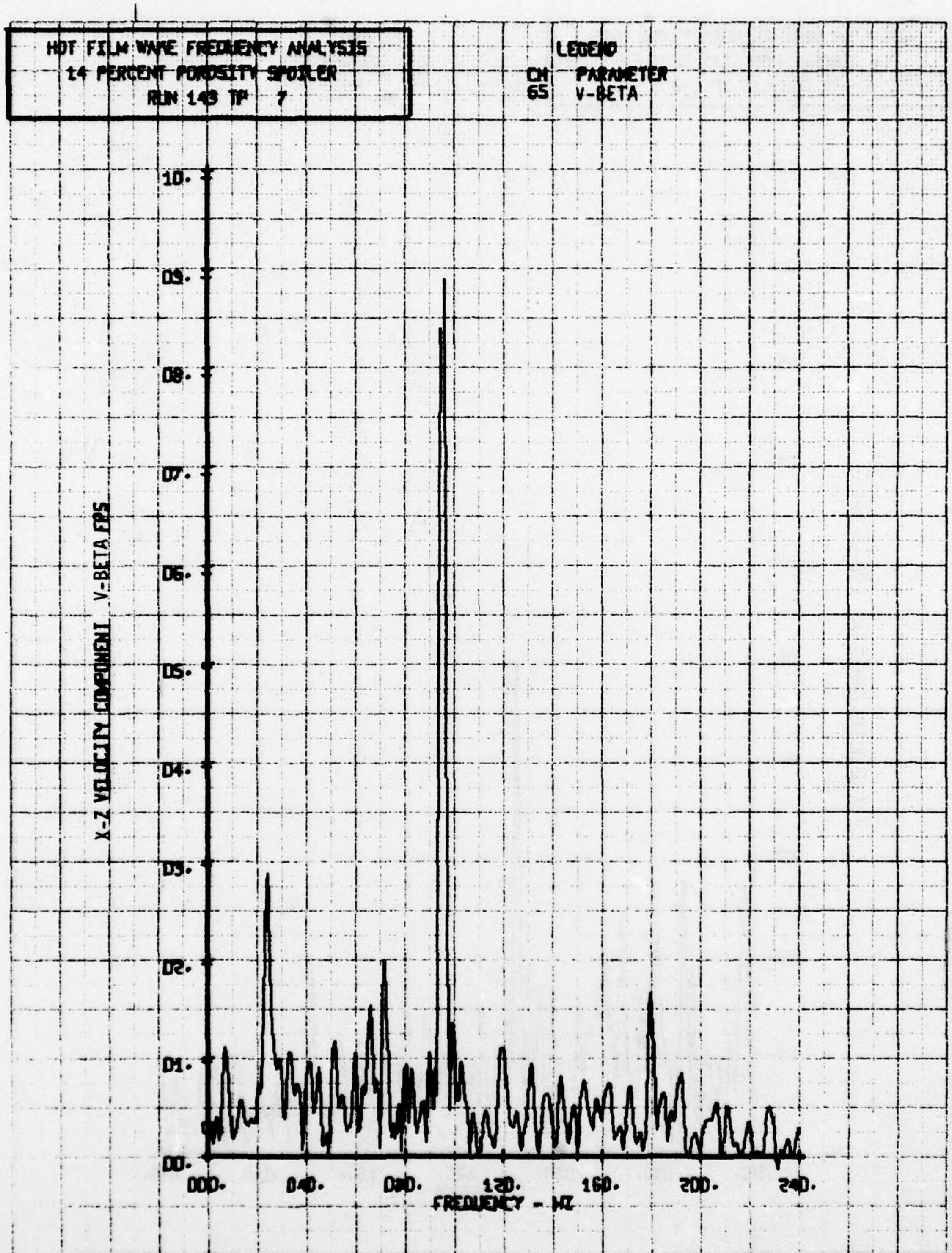
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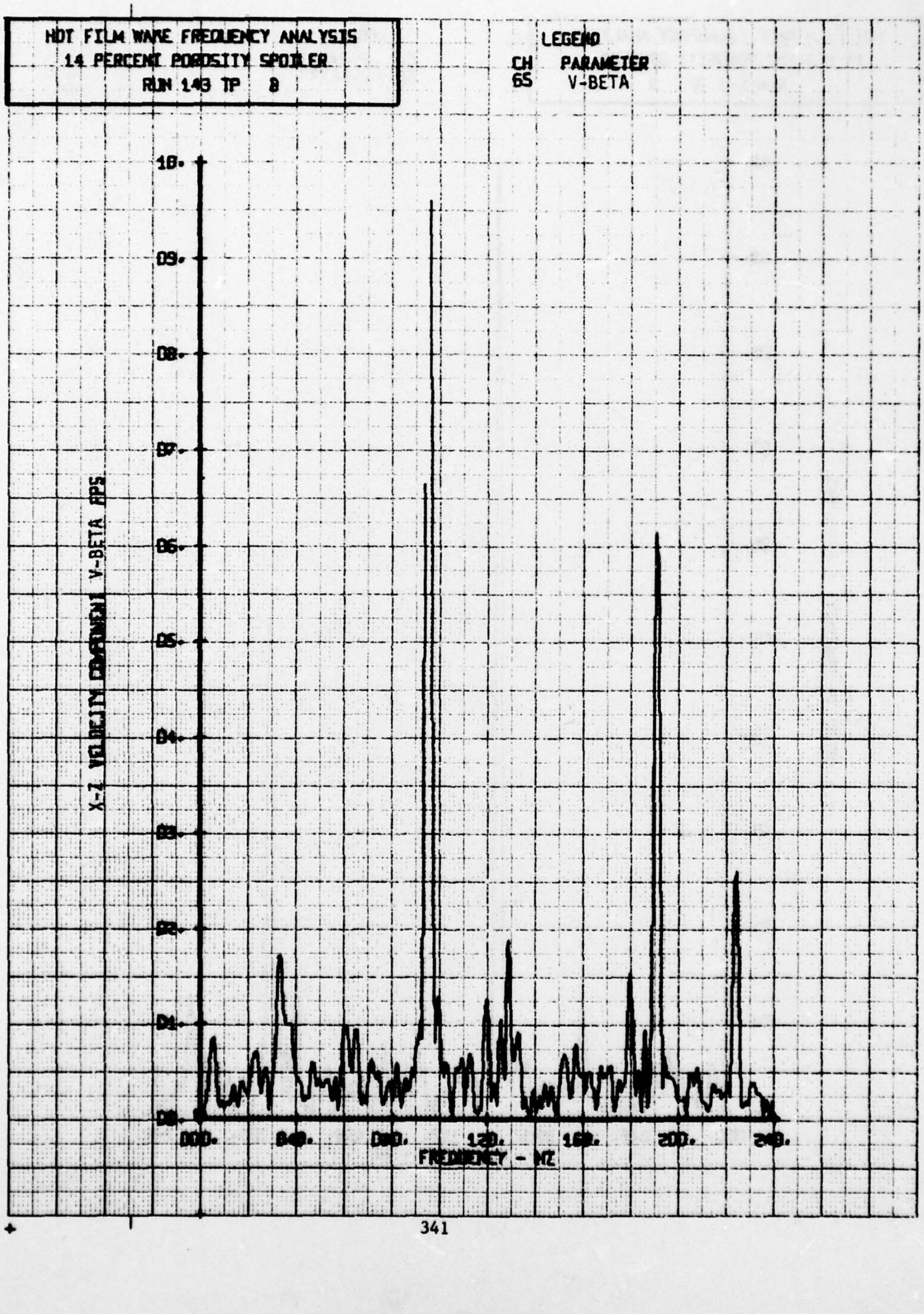
X-Z VELOCITY COMPONENT V-BETA FPS
FREQUENCY - HZ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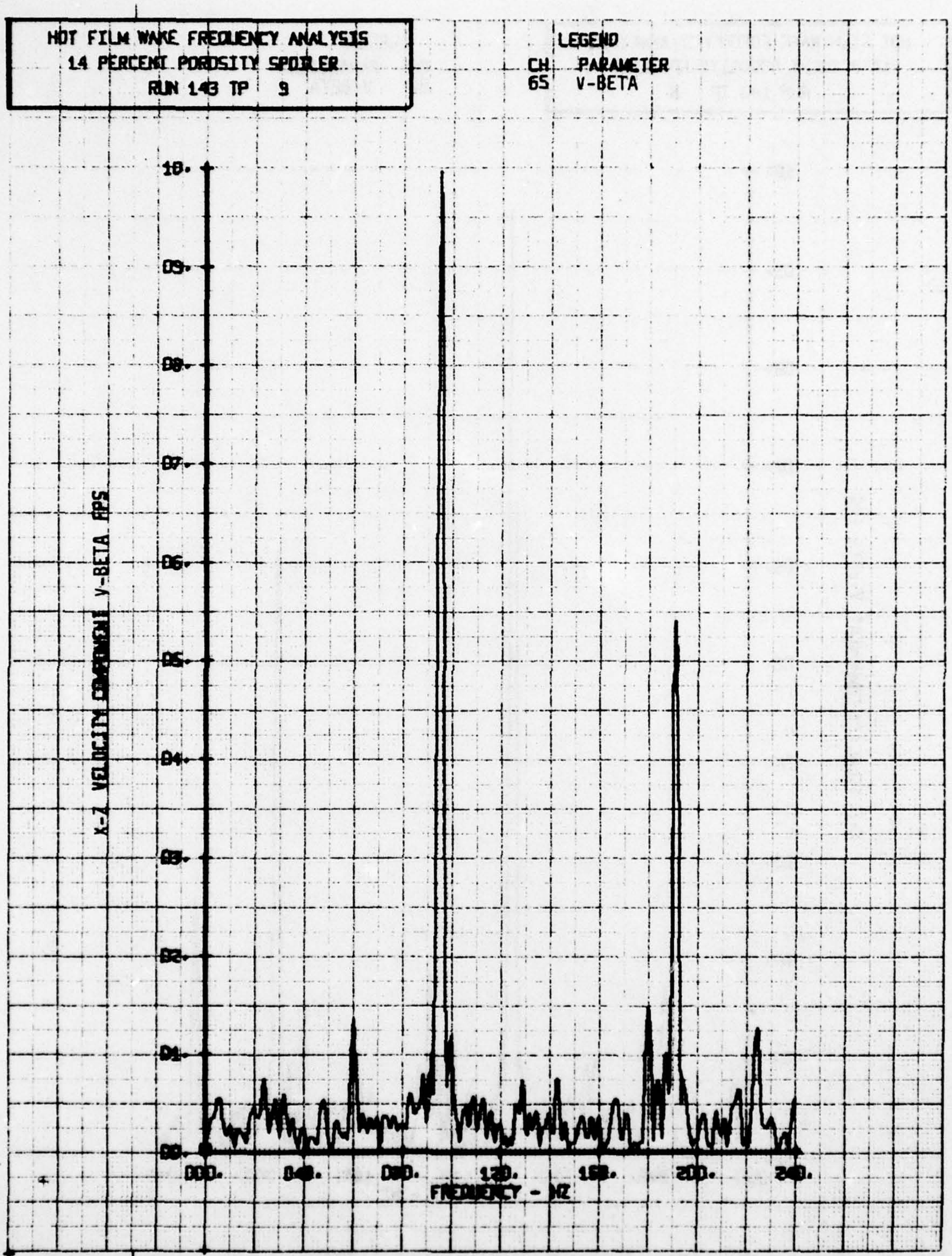
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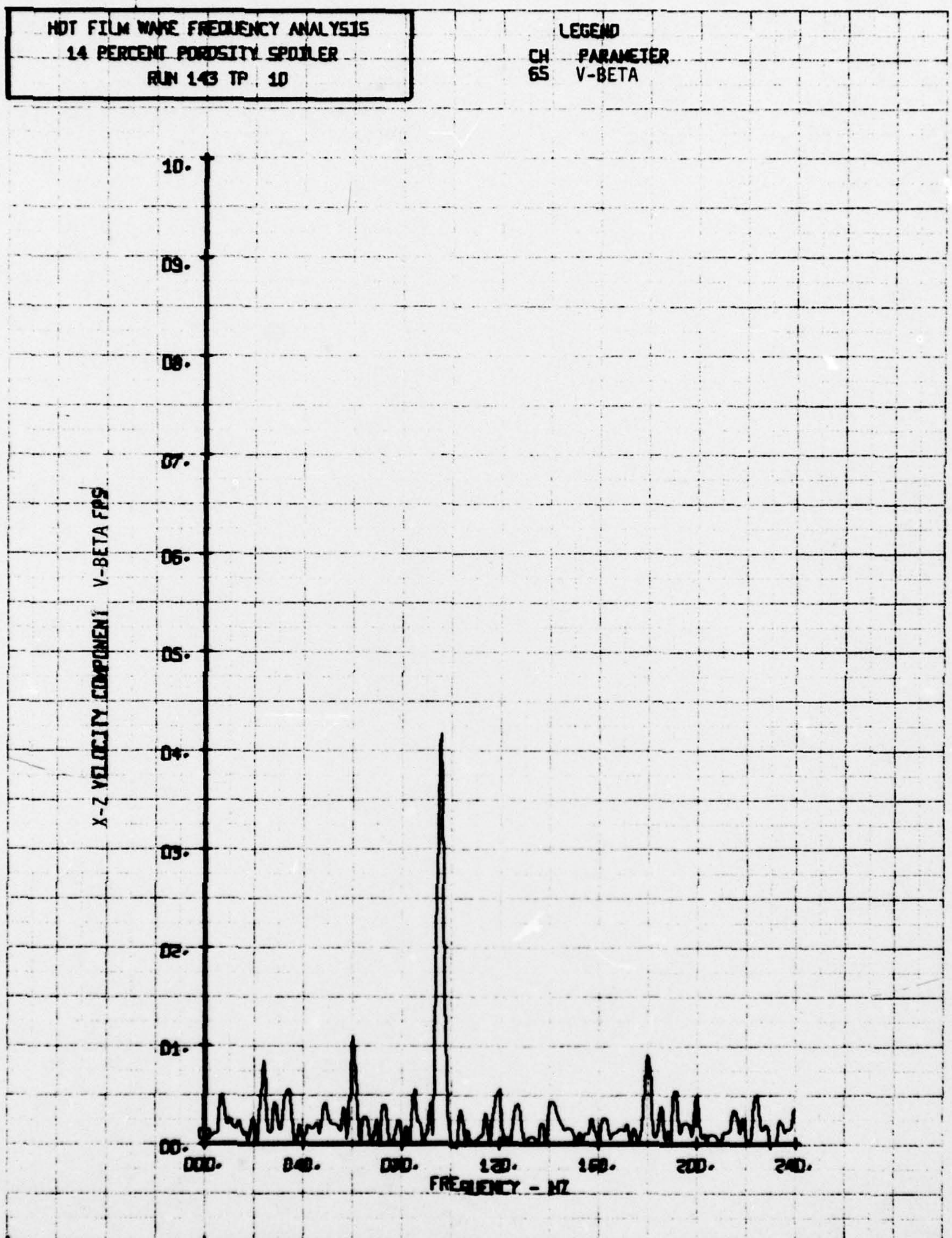
HOT FILM WAKE FREQUENCY ANALYSIS
14 PERCENT POROSITY SPOILER
RUN 143 TP 10
LEGEND
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X-Z VELOCITY COMPONENT V-BETA FPS
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